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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, April 11, 1938. The President, Mr. A. H. Chisholm, C.F.A.O.U., presided, and about 100 members and friends attended.

The senior Vice-President, Mr. Geo. Coghill, announced that the President was leaving for England within a few days. All members of the club would look forward to his return. On behalf of the committee he had pleasure in presenting to Mr. Chisholm books by H. V. Morton: *In Search of Scotland* and *In Search of England*.

Mr. Chisholm, in returning thanks, said that he would do all he could to further the interests of the Club while abroad.

ILLUSTRATED LECTURE

An illustrated sesqui-centenary lecture, entitled, "The Introduction of the Australian Flora to the Old World," was given by Mr. E. E. Pescott, F.L.S.

WELCOME TO VISITORS

The Chairman welcomed to the meeting Mr. and Mrs. Raven from New Zealand, and Mr. R. Arnott, from Sydney.

CORRESPONDENCE

From the Flower Day Committee, asking for donations of flowers, etc.

From the Federation of Victorian Walking Clubs regarding a hut recently erected on Crown land at Mt. Freezout, and asking the Club to join in a protest to the Minister. Mr. R. H. Croll moved that a delegate be appointed to attend a proposed deputation to the Minister of Lands. Mr. G. Barrett seconded the motion, which was supported by Mr. A. S. Kenyon, and carried. On the motion of Mr. E. E. Pescott, seconded by Mr. R. H. Croll, Mr. A. S. Kenyon was appointed as delegate.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows:—Woods Point, Mr. S. R. Mitchell; Badger Creek, Mr. H. C. E. Stewart.

GENERAL BUSINESS

Mr. R. H. Croll asked for leave of absence for two months, as he was again visiting Central Australia.

The Secretary asked for suggestions for the new excursion list.

NATURE NOTES

Mr. L. W. Cooper drew attention to the long-distance travel of thistledown.

Mr. V. H. Miller, referring to the long spell of dry weather, stated that in the Castlemaine district Eucalypts were dying by the roadside.

EXHIBITS

Mrs. J. J. Freame.—Living marine creatures, including a young Feather-star, a Sea Anemone, and Molluscs.

Miss Cornish.—Helmet Shell.

Mr. Chas. Barrett.—Stone-making Fungus (*Polyporus basilaroides*) from Annuello, Victoria.

Mr. T. S. Hart.—A Lignum (*Muehlenbeckia gracillima*) collected by Mr. W. Hunter, at Cann River; a new record for Victoria. The White Mat-rush (*Lomandra leucocephala*) and the Flat Templetonia (*T. sulcata*), both collected by J. Rickard, at Galah.

Mr. W. Abrahams.—Large series of geological specimens to illustrate the various deposits visited during the Club's Walhalla-Woods Point excursion.

THE FLORA OF MITCHAM

County floras are published in England—one has choice of several for one county, in some cases; but here we have only works dealing with the plants of a whole State. Mr. J. W. Audas has now given us a district flora, and it should be followed by other handy little guides—"The Flora of the Dandenongs," for instance. Our botanists have a wide field, with districts as large as some English counties. Small books, scientific, yet popular, are needed.

The Flora of Mitcham, based on a lecture given by Mr. Audas before the Mitcham Naturalists' Club, is an attractive booklet, with a full list of the plants occurring in the district. This flora, the author says, "has a special interest in being the richest and most accessible for purpose of collecting and study, containing a comparatively large number of species, representing the most important and characteristic families of Victorian plants, the knowledge of which gives a good insight into the features of the Victorian flora generally."

Copies of the booklet (price, 1/- each) are obtainable from the author.

Plate I



The Allied Rat

Uromys phillipi (R. J. Little, 1938)

THE BUSH BY NIGHT

By R. T. LITTLEJOHNS

As the Australian furred animals are mainly nocturnal in their habits, they may be photographed under entirely natural conditions only at night—thus, at least, it has always appeared to the writer. This belief has led to years of experiment with the object of evolving a satisfactory system of automatic flashlight photography.

Actually, the idea of using an automatic flashlight originated with a desire to prove why the common Yellow-tailed Thornbill builds an open nest or "sleep-out" attached to the nest chamber, which is domed and enclosed. The necessity for using a self-acting device to photograph the Thornbill's home at night arose from the fact that the presence of the photographer near the nest after dark would probably cause the sitting bird to leave her eggs. After three or four pictures had been made by a primitive contrivance of clocks and cords and springs, the problem of the extra nest still remained unsolved. On no occasion was a bird in occupation of the top nest; but the result, nevertheless, could not be regarded as conclusive. The experiment with the Thornbills was abandoned in favour of other projects, which had then suggested themselves, and gave some promise of positive results. Attention was directed to nesting birds, those with open cup-shaped nests.

After many failures, a fairly successful picture was made at the nest of a Yellow Robin, in which two partly-fledged chicks were being attended by their parents. The camera was focused on the nest in daylight, and the flash was set for 12 p.m. At midnight a small clock opened the camera shutter for one second, and during that second the flash powder was ignited also. There were, of course, many difficulties which it had been necessary to overcome, not the least of which was the protection of the flash powder from the damp night air. However, in the morning the flash-lamp was found to be open, and the grey ash within indicated that that portion of the apparatus, at any rate, had operated satisfactorily. There was mild excitement connected with the development of the negative, it being the first from which a definite result could be expected. The parent bird was found to have had her head entirely hidden beneath her wing, while the head of one of the chicks was protruding from beneath her feathers.

Several other pictures were made of sleeping birds, but none was widely different from that of the Yellow Robin. All showed the subjects with their heads beneath their wings, and none the non-sitting bird in the immediate vicinity of the nest. It became necessary, then, to find some new use for the flashlight apparatus, and it was at this stage that attention was turned to creatures which are awake and active at night. This involved a further

complete change in the operation of the camera and flash, and accounted for a long period of further experimenting. In fact the experimental stage has not been passed even now. For dealing with sleeping birds the synchronizing of the shutter and the flash was a simple matter, the shutter remaining open for a considerable time, and the flash operating independently, while the shutter was open. When the same system was used to photograph animals it was found to be ineffective. The sound made by the shutter and the shock caused by the explosion of the flash accounted for a rapid movement of the subject which ruined all the pictures taken by this method. It soon became apparent that, instead of the flash occurring during a fairly lengthy shutter exposure, it would be necessary for a short shutter opening to take place during the period of the flash (which may be about one-fiftieth part of a second). This fact has accounted for most of the hundreds of difficulties which have been met with.

The earliest attempt to make a flashlight picture of an animal was a complete failure. It revealed, in beautiful detail, the mouth of a wombat burrow at Sherbrooke, but gave no hint as to the agency which had operated the apparatus. It is possible that an Allied Rat had blundered into the thread controlling the electrical release, but afterwards had moved sufficiently to be out of the picture entirely by the time the flash was ignited.

The apparatus, it may be mentioned, consisted at that time of a hinged box held closed by a sensitive latch. For the photographing of sleeping birds the latch was unfastened by a small clock installed within, and for photographing animals the same latch was operated by an electrical contrivance set in motion by the animal touching a thread or a switch. In both cases the opening of the box fired the flash powder, which was contained in a flash-lamp of the flint and steel type. In practice it was found that the sound made by the opening of the box startled the animal to such an extent that it was almost out of the picture before the flash was actually fired.

It soon became clear that the method of firing the flash must be altered, and, after elaborate experiment a new system was devised, in which the powder was ignited electrically, and the synchronising of the camera was effected by an electro-magnet. In this way it was possible to use the fastest shutter speed provided on the camera then in use ($1/1000$ th part of a second). With this equipment several reasonably good photographs were obtained, but many showed a degree of movement which spoiled the result. Recently a new camera has been obtained which provides shutter speeds down to $1/4000$ th part of a second, and this, of course, is much more efficient than the old one. But the problem, even now, is by no means solved; and in most cases small animals react to

the flash of light so quickly that the outline of the head is blurred on the negative. With the larger animals, an exposure of 1/400th part of a second has been found to be sufficiently short as a rule. Experiments being carried on at present are designed to accustom the animal to the presence of the camera, so that their reaction to noise and bright light may not be so rapid.



Flashlight photo. by R. T. Littlejohns.

Yellow Robin asleep on nest; head of chick protruding.

The results obtained from the automatic flashlight are not outstanding either in quantity or in merit, but the quest for subjects has been intensely interesting. The earliest of the animal pictures were taken at the Bird Cabin on the property of Mr. V. R. Davey, at Toolern Vale. Four or five species of native animals have been seen by the writer in this sanctuary, but, so far, only Silver-grey Opossums have fired the flash traps. The hollow trees about the cabin are the homes of numerous Silver-greys, and their enthusiasm for food is such that the more retiring and more desirable species are forestalled at the traps.

The first visit to Toolern Vale was made in December, 1933, and much of the day of arrival was spent in setting up the flash-lamp and focusing the camera at the foot of a sapling. By evening everything was in readiness, and trails of honey had been laid, all leading to the trap. The bark of the sapling hid an electrical switch connected with a battery and the flash-lamp. The final act of connecting the battery is always thrilling, as any fault in the wiring will cause an immediate explosion. The plate was placed in the camera, and the photographer retired to the cabin to watch through a small hole in the wall.

Hour after hour went by, and nothing happened, although the peculiar snarling of the opossums could be heard near by. At last, the light in the cabin was extinguished in the hope that this may encourage the animals to approach. Through the hole in the wall the ground outside and the trees showed dimly in the light of a half-moon. Soon a shadowy form crossed a well-lighted patch, and the excitement became intense. After much wandering the shadow crept towards the tree near the camera, and breathless minutes seemed like hours. Then there was a blinding flash, which temporarily blinded the eye at the hole in the wall. Within half-an-hour the trap had been re-set, and the first plate was being developed. And so keen are the animals when once they have tasted honey that, before the development of the first plate had been completed, the second one had been exposed to the accompaniment of bright light and muffled report. Both these pictures were fairly successful, but neither shows the whiskers about the animal's mouth. The presence on the picture of these whiskers is the writer's test of a completely satisfactory flashlight picture.

On the second and later evenings of this first visit to Toolern Vale the confidence of the Opossums had been won so completely that many of them appeared as soon as anyone came from the cabin with the saucer in which the honey was carried. Several visits have been made to Toolern Vale since, and many other pictures of the Opossums have been taken, but few have shown detail to the extent which has been mentioned. Many efforts have been made, also, to picture Ring-tailed Opossums, Brush-tailed Phascogales, and Flying Phalangiers at the Cabin. But on every occasion the traps have been sprung by Silver-greys.

At Wheeler's Hill there is a charming patch of timber on a property owned by the Misses Mackintosh, and here, also, the Silver-greys are at home, in convenient hollows. With the co-operation of the ladies it has been possible to entice at least one Silver-grey to a gnarled old tree. Two really efficient pictures taken at this tree (one about six months after the other) clearly feature the same animal. He may be recognized easily by a small swelling near the corner of his eye.

Plate II



Didelphis virginiana (L.) - Silver-grey Opossum

Reference has been made to photographs taken at Sherbrooke in the early stages of the automatic flashlight project. In recent months the flashlight trap has been set often in the forest, but with scant success. Every effort to picture a Wombat as it emerged from its burrow has failed; sometimes because the Wombat has not left the burrow at all, and sometimes because the small Allied Rat has fired the flash before the arrival of the owner of the burrow. After that, attempts were made at points in the forest where well-defined paths told of the nightly passing of the larger animals. Threads were stretched across the paths at a height sufficient to allow the Rats and smaller animals to pass beneath. Notwithstanding this precaution, however, the Silver-grey Opossums have contrived to stand on their hind legs specially to fire the flash before a Wombat passed that way. The springing of the traps by unwanted interlopers is one of the greatest trials of the automatic flashlight.

Many times at Sherbrooke the camera has been set for the Allied Rat, and, except on one occasion, that animal actually has caused the flash to fire. But the Rat is a very nervous creature, apparently, and almost always its head is blurred by the rapid movement which follows immediately on the flash. Even with an exposure of only $1/400$ th part of a second, the camera has been unable to stop the movement. On one occasion two cameras were synchronised with the same flash, one shutter working at $1/100$ th and one at $1/400$ th part of a second. Comparison of the two pictures provides an interesting proof of the distance which the head of the subject may move in a period of $3/400$ ths of a second. On one wet night, however, the rat was caught napping, as it were, and apparently forgot to jump for a small fraction of a second. Even in this case the whiskers which the Rat probably wears are not shown clearly.

In November, 1936, the writer spent a most interesting few days at Alvie, near Lake Corangamite, one of the few districts in Victoria where the Native Cat is still to be found in numbers. Preparatory work was carried out by Mr. Harold Taylor, a young local naturalist, who placed meat for the animals some days before the arrival of the writer. Two separate cameras were set each night, one operating by means of flash-powder and the other by flashlight globes. On the first night both traps were sprung, but on the second night the animals contrived to remove the bait without touching the switches, and no picture was obtained. Because of this experience the baits, on the third and fourth nights, were fastened to pegs and buried immediately beneath the switches. Even a wily Native Cat was unable to counter that move and the trap was sprung on each occasion. In this instance little was learned, by direct observation, of the habits of the

animals, as one fleeting glance was all that was obtained of them. Neither were the photographs obtained entirely satisfactory, as the camera which operated at 1/400th part of a second developed some fault which was not discovered until the negatives were developed. Of the exposures made by the less efficient camera, two produced reasonably clear pictures of the Native Cats, whilst



Flashlight photo. by R. T. Littlejohns.

Silver-grey Opossum

a third showed the head and shoulders of a dog which had made an unauthorized visit from a farm some distance away. It is hoped that, at some future time, a further opportunity may present itself to study, at least photographically, this interesting animal.

Undoubtedly the most attractive expedition in quest of flashlight pictures was one to the Whipstick Scrub, some twenty miles from Bendigo. Its attractiveness lay mainly in the fact that the area is unsettled and one felt that one was dealing with animals

Plate III



Native Cat Emerging from a Hole, A vie, Victoria



Flashlight photos. by R. T. Littlejohns.

Native Cat, photographed at A vie, near Lake Corangamite, Victoria

in their primitive state. The expedition was suggested and made possible by Mr. Marc Cohn, who wrote to tell me of the footprints of wallabies in the mud around a waterhole deep in the scrub. Mr. Cohn offered to accompany me to the spot, and before my arrival he and Mrs. Cohn had cleared much undergrowth from a disused track in order that access to the waterhole should not be difficult.

On a hot Saturday afternoon in March, 1936, therefore, we set off with tent and camera for the scrub. Before dark the camera had been placed in position on one bank of the waterhole and focused on the water's edge on the opposite side. As the sun sank red behind the stunted mallee, the last connections were made between the flash lamp and camera on one bank and a switch and a black thread at the spot on which the camera was focused. Then we retired to a little distance and waited for the arrival of the animals. Darkness came and a full moon traced fantastic patterns on the sloping mud around the waterhole.

Much sooner than we expected a distant thumping sound broke in on the croaking of frogs and the singing of crickets. The thumping grew louder, ceased for a minute or so, and grew louder still. There was a crashing amongst the scrub which fringed the sloping banks, and a dark form shuffled silently into the moonlight. For several minutes the shadow remained still and then, apparently uneasy and suspicious, hopped noisily back into the scrub. There it remained, its presence disclosed by occasional thumps on the hard ground.

By this time other distant thumpings became evident. They increased in volume and in numbers until the otherwise silent night was full of them. In the space of a few minutes a dozen Wallabies must have been sniffing the air at different points around the top of the bank. Then one ambled silently a yard or two towards the water, and another and another. At some real or imagined hint of danger, all turned and crashed again into the scrub. In a quarter of an hour little progress had been made, but at length the thirsts acquired during a parching day overcame suspicion and fear, and one of the animals reached the water's edge. After a further delay there commenced a noisy lapping of water. The sound was what one would expect of a giant cat lapping from a huge saucer.

A dozen other Wallabies were quickly convinced that no danger threatened, and soon there were a dozen separate lappings. But still no animal had visited the section of the bank where the switch awaited its victim. There was renewed thumping as a newcomer approached, and further crashing as he reached the circle of scrub. He paused a few minutes on the top of the bank directly above the switch, and then moved down silently

towards the water. The watchers held their breaths for a long five seconds, then there was a dull explosion and a vivid light which shocked animals and humans alike. For an instant everything was still, and then noisy crashings told of the hurried departure of a dozen Wallabies.

With the aid of torches the flash-lamp was re-charged with powder and the battery connected once more. Scarcely had the



Flashlight photo. by R. T. Littlejohns.

Wallaby of the Whipstick

photographers returned to their hiding places when the thumping was renewed as the animals returned to complete their interrupted drinking. In a little time the flash-trap was sprung again, and two tired humans crept into their tent, there to be tormented by mosquitoes and disturbed by the noisy crashings of Wallabies throughout the night.

The following night the writer's wife remained with him, whilst Mr. Cohn returned to Bendigo. During the heat of the day the cameras had been set with more care than had been possible on the previous day, and at sunset everything was in readiness. The

experiences of the previous night were repeated, and two additional exposures were made. At eleven o'clock, after the second firing of the flash, the cameras were packed away and the journey back to Bendigo was begun. For two miles the difficult track led through close walls of scrub, and the wife of the writer breathed a sigh of relief to find that, after all, we were not hopelessly lost. At Bendigo, Mr. Cohn had supper ready, and thus ended an expedition which will remain always as a very pleasant memory.

In time, probably a very long time, it is hoped that all the difficulties connected with this branch of camera hunting will have been overcome. It may then be possible to undertake really elaborate expeditions to remote parts with reasonable certainty of success. It is hoped, even, that on some such expedition animals which have been lost for many years may be found captured by the camera-traps.

A NOTE ON PERIPATUS

A living specimen of *Ooperipatus insignis* was sent to me from St. Mary's, Tasmania, but died two days after arrival. It was kept in a tin with pieces of damp rotting wood (a suitable environment), and was not unduly bothered after photographs had been taken—probably the first to be made of this strange "half-way" animal, connecting link between Myriapoda and the Annelid worms.

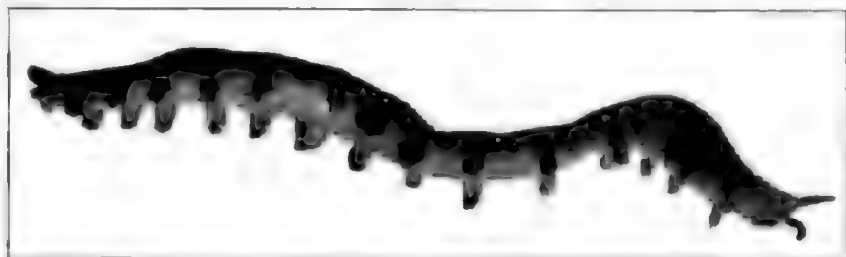


Photo. by H. J. Gedden.

(*Ooperipatus insignis* ($\times 3$))

When captured, the *Peripatus*, which measured $1\frac{1}{4}$ inches in length, and was of a delicate fawn-brown colour, showed resentment by ejecting from its papillae a viscous substance—the slime which justifies the name slime-worm, for members of the class Prototracheata (there are between 50 and 60 species). There was no such demonstration after the specimen reached me; in fact it could not be persuaded to produce more than a drop of slime. One admired the beautiful velvety skin and the graceful movements of the slime-worm; it made elegant loops and curves as it

ambled along on fifteen pairs of legs. When gently turned over it righted itself at once, but slowly.

Peripatus is deliberate in progression, but could easily overtake a slug or a snail. Its antennae are usually in slow motion, and give the little creature a quaintly attractive appearance when extended laterally, as shown in one of the photographs reproduced.

I have had several live examples of *Ooperipatus insignis*, which is native to Victoria, as well as Tasmania; and have also collected *Ooperipatus oviparus*, which ranges from Queensland to Victoria. In the Macpherson Ranges, southern Queensland, a specimen of *O. oviparus* was found beneath a big decaying log. New Zealand has several oviparous forms. One of our species, *O. oviparus*, I believe, was the first of the slime-worms to be credited with lay-



Ambling gracefully along—*Ooperipatus insignis* (much enlarged)

ing eggs; until then viviparity was thought to be the rule without exception among the slime-worms. Even now, some zoologists are doubtful whether there are egg-laying forms. But the late Dr. A. Dendy did not found the genus *Ooperipatus* on slender evidence. Several New Zealand species are oviparous.

Occasionally, when sifting damp moss from fern gullies, a *Peripatus* is found. Though generally regarded as rare, or at least uncommon, these intriguing little arthropods, primitives standing alone, may be fairly plentiful in our hill country. Mr. John Clark, entomologist at the National Museum, says that when you know just where to look for them, you can find dozens of specimens. However, very few are collected, and at the present time nobody in the Commonwealth is especially interested in the *Peripatus* clan. I know of no research work being done here on the slime worms. But important papers by Dendy, Fletcher and Steel, will be found in the *Proceedings* of the Linnean Society of New South Wales, 1894-96.

CHARLES BARRETT.

INTRODUCTION OF THE AUSTRALIAN FLORA TO
THE OLD WORLD:

By E. E. Pescott, F.L.S.

*(Lecture given before the Field Naturalists' Club of Victoria,
April 11, 1938.)*

This paper cannot more fitly be opened than by giving some quotations from Hooker's Introductory Essay on "The Flora of Australia." He says: "The Flora of Australia has been justly regarded as the most remarkable that is known, owing to the number of peculiar forms of vegetation which that Continent presents. So numerous, indeed, are the peculiarities of this Flora, that it has been considered as differing fundamentally, or in almost all its attributes from those of other lands, and speculations have been entertained that its origin is either referable to another period of the world's history from that in which the existing plants of other continents have been produced, or to a separate creative effort from that which contemporaneously peopled the rest of the globe with its existing vegetation: whilst others again have supposed that the climate or some other attribute of Australia has exerted an influence on its vegetation, differing both in kind and degree from that of other climates."—"It contains more genera and species peculiar to its own area, and fewer plants belonging to other parts of the world, than any other country of equal extent."

To botanists and gardeners in the Old World, the introduction of such a flora as described by Hooker must have been very startling. In the pre-New Holland era, a few species would come now and then from America, and a few from China—these would provide occasional interest. Then came the Cape Flora: and prior to the New Holland explorations, the plants of South Africa gave very considerable interest. But the introduction of these was spread over many years, and only a few at a time would arrive.

Dampier's plants from New Holland must have occasioned some surprise, but even of these there was not a considerable number. Then Labillardière came, whetting the botanists' appetites for more.

And at last the plants of Banks and Solander, and of Brown, Bauer and Good burst on the world, literally in hundreds. The result must have caused almost consternation in the scientific world of the eighteenth century. Could it be true? Were such things possible? We know what they said of the Platypus! and how they wondered at the Kangaroo! Month after month and year after year passed, and still the treasures kept pouring in. It was a genuine period of remarkable botanical surprises. No

wonder that the eyes of the whole plant world were centred on New Holland.

In this paper, only the introduction of the flora can be described; subsequent introductions and workers may form the subject of some future study.

The first New Holland plants to be taken to the Old World were those of William Dampier, who, with his crew of buccaneers and his ships, "Bachelor's Delight" and "Cygnel," visited Cygnel Bay, on the north-west coast of the Continent, in 1688. Dampier was the first to tell of the Eucalypts, describing them as "the largest of any (trees) there." He called them "dragon trees," because "the gum distils out of the knots and cracks that are in the bodies of the trees. We compared it with some Gum-dragon or Dragon's Blood that was aboard, and it was of the same." He described the "heath"—much of the kind—growing on our commons in England. The trees were "curious," the foliage was "curious"—"most of the shrubs had either blossoms or berries on them." The blossoms were "mostly blue"—this statement would cause much discussion among English gardeners, for they have always sought for blue flowers. Dampier continues: "Some very small flowers growing on the ground that were sweet and beautiful, for the most part unlike any I had seen elsewhere." He recorded that the Rosemary shrub grew plentifully but "had no smell."

Unlike Gordon of a later date, Dampier reports: "most of them with a very fragrant smell," and of all the plants, his reports were most enthusiastic. It seems strange that a man of such a nature, a buccaneer, should write as enthusiastically of the wild flowers, but it is stated that he "was well acquainted with botany." He collected well, but many of his specimens were lost: of the few that remained, these are now housed at the herbarium of the Oxford Botanic Gardens. There are forty of them, collected possibly from his second voyage of 1699, when, on the "Roebuck," Dampier's plants included *Casuarina*, *Goodenia*, *Lotus*, some Myrtaceae and Leguminosae, and that glorious and rich blossom which commemorates him, "Sturt's Desert Pea," *Chanthus Dampieri*. Dampier's description of this is that the blossom resembled "a bean blossom, but much larger and of a deep red colour. Looking very beautiful."

Dentrecasteaux's expedition in search of La Perouse carried with it two great naturalists, Labillardière on the "Recherche," and Riche, on the "Esperance." Labillardière introduced to the world some very fine copperplate engravings of plants, in the report which was published in 1800. Again, the world is told of the beauty of the flora—"I was struck with the beauty of the flower of a new species"—"this beautiful tree"—"I discovered a very

beautiful plant"—"amongst a variety of other beautiful plants"—these are a few of his many enthusiastic remarks.

There are nine illustrations, which include *Diplarrhena moraea*, *Eucalyptus globulus*, *Exocarpus cupressiformis*, *Eucalyptus cornuta*, *Chorizandra ilicifolia*, *Amigozanthos rufa*, *Banksia repens*, *Banksia* (now *Dryandra*) *virca*, and *Richea glauca*, now *Cyathochaeta Richea*. The latter commemorates his friend and companion, Citizen Riche. When these pictures are examined, it is doubtful if better drawings could be made to-day, that of the "Cherry Ballart" being exceptionally fine.

On this expedition, Riche was lost for several days; during that time he had lived on the berries of a coastal plant which was afterwards dedicated to him, *Lewopogon Richei*.

The work of two men, who explored the eastern shores and ocean, is not generally known, partly because they came just before the "First Fleet" period, and all advertisement was given to the efforts of Botany Bay colonization. They were the two Forsters, father and son, Johann Reinhold Forster, and Johann Georg Adam Forster. Both were Doctors of Medicine who accompanied Cook on his second voyage. Among their many works, father and son published a book, "Characteres Generum Plantarum quas in itinere at insulas maris Australis," 1776. This work has 75 plates. The son published in 1786 a work entitled "De Plantis Esculentis Insulamin Oceani Australis." Both books are very useful and informative, and no student can afford to pass them by.

The Forsters are commemorated in many plants, possibly the best known to us is *Microseris Forsteri*, the native "Yam."

On April 19, 1770, just 168 years ago, a small ship of 370 tons, sailing north-westwards from New Zealand, sighted land. The Commander was the illustrious James Cook: with him were two equally famous men, Joseph, afterwards Sir Joseph, Banks, and Dr. Carl Solander. The Endeavour had circumnavigated New Zealand, discovering the two large islands: a "consultation" was then held, from which the decision came to "fall in with the coast of New Holland as soon as possible." Banks would have preferred a voyage to the Polar regions, but finding that impracticable, voted for the course, which resulted in the discovery of New Holland and New South Wales. This was not only a momentous decision for the World and the Empire, but also for botanical science. Landing on the shore of a harbour or "inlet" which was peopled by "Indians," they saw their first gum tree—"trees—one which was large, yielding a gum 'much like *Sanguis draconis*'"; thus coming to the same conclusion that Dampier had come to, nearly one hundred years before. The "inlet" was named Botany Bay, and it must have been well

named, for at the end of the third day, Banks found that "Our collections of plants was now grown so immensely large."

The plants so collected formed part of the new world-famous Banksian Herbarium which is housed in the British Museum. There were nearly 1,000 species as collected, of which only a portion was published in Brown's *Prodromus*. One result of Banks' exploration was the engraving of 700 copper plates, illustrating the plants so collected; this was done at Banks' expense; but they were never published. Banks introduced to the world above 3,900 species of Australian plants. Banks was a wealthy man, with an annual income of £6,000; and not only did he spend many thousands in the prosecution of the study of Australian plants, but he was enabled to place Robert Brown "in a financially independent position," so that he could continue this great work. The "financially independent position" consisted in an annuity of £200, with the full use of the library, herbarium, manuscripts and all other collections. Brown also had the use of Banks' house after the death of Lady Banks.

It was this marvellous herbarium of 3,900 species that was largely employed by Bentham in the preparation of "*Flora Australiensis*."

One surprising result of all these collections is the paucity of descriptions of the genus *Eucalyptus*. These collectors must have observed dozens of species; and yet it remained for later generations, notably von Mueller, to publish them.

Banks collected two well known species of plants at Botany Bay, which are typical of their genus, *Banksia integrifolia* and *B. ericifolia*.

Two most notable voyagers were Mr. David Nelson and Mr. William Anderson, Surgeon. These two men accompanied Cook on his third voyage, when he visited Van Diemen's Land in 1777.

Dr. Anderson collected many plants, which were later described by Robert Brown. Brown dedicated a genus of *Epacridaceæ* to him, *Andersonia*; and in his "*Flora Novæ Hollandiæ*," Brown gives due credit to Anderson, a credit rarely acknowledged in these days, of being the first to name our Eucalypts. Dr. Anderson sent the plants home with the label "*Aromadendrum*," and there can be no doubt that this should be the name of this great race of Australian trees. However, the name and description were not published, and when the Frenchman, L'Héritier, visited Kew in 1786-87, he founded the genus *Eucalyptus* on Anderson's specimens, ignoring and apparently suppressing Anderson's prior name.

David Nelson, Dr. Anderson's companion, was botanical collector on the "Bounty" when, in 1787 the ship sailed for Tahiti on the well-known "Breadfruit" tree transporting. He was one

of the group who was sent adrift by the "Bounty" mutineers, and as a result of this exposure he died at Koepang, Timor, in 1789. He introduced to England *Oryzabium ellipticum* and *Melaleuca squarrosa*. Robert Brown dedicated the genus *Nelsonia* to him.

It is too late in the day to make any changes in the nomenclature of the genera of plants sent to England by Dr. Anderson. At the same time it is very unfortunate, and it seems to us to be very unfair, that other botanists, including Banks, Smith and L'Héritier, should have suppressed his manuscript names and substituted others of their own coining. Anderson named and sent home specimens of plants which he named *Aromadendrum*, *Colema*, *Euphocarpus*, and *Romsuia*. These were changed to *Eucalyptus*, *Goodenia*, *Correa* and *Rauera* respectively. These four well-known generic names indicate the importance of Anderson's discoveries.

Practically every author of the earliest days of the nineteenth century had some tale to tell of the flora, some more and some less. It is very interesting to note the presence of the "grass tree" (*Xanthorrhoea*) in a very large number of the pictures of the landscape. Phillip made a feature of it in his work, and I suppose because of its unusual appearance it was copied and re-copied, until it would appear to be a general feature of the New Holland landscape.

The old pickpocket, Barrington, figured it in all editions of his "History." He illustrates five species of plants in colour, and there can be no doubt that the very extraordinary colouring of the plants, especially in the 1810 edition, would create great wonderment in the Old World. The very unusual colouring which depicts *Banksia sericata* would make it a very desirable and much sought for shrub if it were only true.

The most important epoch in the discovery of the New Holland plants, and their introduction to the Old World was the voyage of Flinders, in 1801, with his three ships, the "Investigator," "Porpoise," and "Cumberland." There accompanied Flinders three really great men, whose names will live for ever in the work of investigation and nomenclature of the Australian flora. They were Robert Brown, of whom Humboldt said that he was "easily first among botanists"; Ferdinand Bauer, a distinguished artist and microscopist; and Peter Good (commemorated by *Goodia*), an excellent collector and gardener. A very good account of the life and work of Robert Brown is given in Dr. Rogers' book on "South Australian Orchids." There is also a portrait

There can be no doubt that the botanical results of this expedition were "incomparably greater, not merely than those of any previous voyage, but than those of all similar voyages put

together" (J. D. Hooker). In 1810, and in 1814, Brown published his collection of plants, in the book known as "*Prodromus Florae Novae Hollandiae et Insulae Van Diemen*," a very wonderful book, for it contains a full botanical description of many hundreds of new plants from New Holland, included in 450 pages, none of which had been previously known. No wonder that J. D. Hooker, himself a great botanist, said in 1859 that this work "has for half a century maintained its reputation impugned, of being the greatest botanical work that has ever appeared." In Germany, the work was acclaimed as "*Opus aureum*."

Ferdinand Bauer was the artist and draughtsman. He made about 1,600 drawings of plants, "all of them accompanied by minute dissections"; of these 1,541 were of New Holland plants. His brother, Francis Bauer, was also a distinguished artist, and although he never visited Australia, he did much work in delineating the plants of this country. Of the brothers, Banks says, "the finished drawings of the two brothers—which for beauty, accuracy and completeness of details, are unequalled in this or in any other country in Europe." Banks left Francis Bauer £300 a year to enable him to continue in this work. Many species, as well as the Genus *Bauera*, commemorate the brothers.

Peter Good was considered by both Brown and Banks as "valuable" and "active." He, unfortunately, died of dysentery shortly after the ship left Timor; he was buried there, the ship returning for that purpose, in 1803. Good did much collecting, especially the seeds of plants. Thus were introduced by him seeds of *Proteaceae*, *Myrtaceae*, and shrubby *Leguminosae*. From these seeds many plants were grown, which "made Kew famous for New Holland plants, Dr. Lindley calling special attention to these in 1838."

BOOKS

The first book dealing exclusively with Australian plants was that of Smith, who sent out his "*Specimens of the Botany of New Holland*" in 1793. Dr. Smith herein introduced the Waratah to the world. Smith's hand-coloured plate of the Waratah, by Sowerby, is reproduced in Baker's "*Australian Flora in Applied Art*." Smith records it as "The most magnificent plant which the prolific soil of New Holland affords."

Following this came Labillardière's book, describing plants which, as he records, had already been described by Nelson.

An early and very noteworthy book gave the Old World people a wonderful glimpse of the beauty of the New Holland Flora. This is Sweet's "*Flora Australasica*," a book published in 1827-28, containing 56 very beautiful hand-coloured copper engravings of plants, all of which had been grown from imported seeds, and

flowered in England. Again we may remark on the paucity of Eucalypts in the work, only one being figured, and this under the generic name of *Eudeumia*. Among some of the very beautiful prints are *Correa pulchella* (now *rubra*), *Billaehiera Scandens*, *Sphenotoma gracilis* (*gracile*), *Epacris impressa*, *Boronia serrulata*, and *Dryandra nervosa*. All of the drawings were by E. D. Smith, botanical artist. It seems amusing, to Australian horticulturalists, to note that most of these plants can be increased by raising the new plants from cuttings, including Eucalyptus and Acacia, a method as yet unknown to modern propagators.

To Tasmania belongs the honour of being the first State to issue coloured plates of the flora. The first of these pictures was issued in Ross' "Van Diemen's Land Annual" for 1833 (page 84), and is entitled "A Nondescript Plant growing in moist, sandy places at Woodman's Hill, near Hobart Town, flowering in December and January." The plant is *Chiloglottis rolfera*, previously *C. diphylla*, one of the well known "bird" orchids. The picture is a copper engraving, hand coloured, and the artist is C. Bruce.

Four years later, in Elliston's "Hobart Town Almanac for Van Diemen's Land" of 1837, a coloured plate of over a dozen well-known flowers was issued, which included three orchids. The plate is again a hand-coloured engraving, and the artist is unknown, the initials being M.M.A.

A few lesser known men, but men who have left their mark and their names on our flora, may be mentioned. Archibald Menzies visited King George's Sound in the "Discovery" with Captain Vancouver's expedition, where they stayed for a fortnight in 1792. Menzies was a surgeon and a botanist who was recommended by Banks and instructed by Brown. Menzies sent home from King George's Sound "a copious collection of its vegetable productions, principally the genus *Banksia*, which are here very numerous." He is commemorated in our flora by six species, including a *Drosera*, *Utricularia*, *Banksia*, *Leptoceras*, *Caladenia* and *Thysanotus*.

Captain Philip Parker King is now almost unknown. He had a great love for natural history, and as well, was a complete navigator. He must not be confused with Captain Philip Gidley King, who was third Governor of New South Wales. P. P. King did some remarkable surveying work in a small boat of 84 tons, going on prolonged voyages as far as King George's Sound (from Sydney), thence northwards to Exmouth Gulf, onwards to Goulburn Islands, and then on to Timor. From thence he returned, down West Australia, through Bass Straits, and back to Port Jackson, 1818. Next year he went round Tasmania. The next year northwards, crossing the Gulf of Carpentaria and on again

to Timor, returning via Bass Straits. The next year (1820) he went again north to the Gulf of Carpentaria, again going round the continent, passing through Bass Straits, when the boat was nearly wrecked at Botany Bay, returning, however, to Port Jackson, after a six months' voyage.

King then, next year (1821), took a somewhat larger ship, went on through Torres Straits, across the north, then across the Indian Ocean to Mauritius. He returned to King George's Sound; and, again going northwards through Torres Strait, he returned to Port Jackson in 1822.

Can we imagine what all of these voyages mean nowadays! Each one was an epic! And I doubt if many of us could even venture on a trip along the Victorian coast in such small boats.

P. P. King was accompanied on these voyages by one of Australia's greatest and most intrepid botanical explorers, Allan Cunningham. They were both great friends, and they accomplished much. Allan Cunningham also made most extensive land journeys, collecting many hundreds of new plants, and there is not space here to set out these and his work. That must be done another time. His travels were the most extensive and continuous that have ever been carried out in the Commonwealth.

Governor Philip Gidley King was a friend and protégé of Banks. He was a good naturalist and sent "Home" many valuable and interesting specimens, including collections of seeds. He sent "a fruit growing around Port Stephens," and "two warrattarrs." Allan Cunningham was a friend of Governor King, who helped him and encouraged him in his work. Allan Cunningham's tomb is fitly placed in the Sydney Botanical Gardens.

Time does not permit of the telling of the work of Richard Cunningham, Darwin, Ross, McGillivray, Baudin, Leschenauk de la Tour, Freycinet, Lesson, Wilkes, as well as that of Oxley, Sturt, Grey, Backhouse, Mueller, Leichardt, Bunce, Babbage, Gunn, Drummond, Archer, Mitchell and many others. They, with those more extensively discussed, took their part in letting the Old World know of the New Holland-Australian flora, a flora that excited admiration and wonder everywhere that the tale was told, and one that, to-day, ranks second to none of any of the World's Continents.

NOTE.—The "consultation" referred to in connection with the voyage of Cook, after leaving New Zealand, is referred to by Banks, who considered the scheme the "most eligible, to explore for the" southern (polar) continent. However, it is now known that Cook had received from the British Government secret instructions to visit New Holland, so that, on his part, at least, the meeting must have been more or less of a "bluff."

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No. 654

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, May 9, 1938. The Senior Vice-President, Mr. Geo. Coghill, presided; and about 100 members and friends were present.

The Vice-President referred to the deaths of Mr. J. H. Harvey, who had been a member of the Club since 1905; Mr. C. Lambert, who had acted as auditor on several occasions, and Mrs. A. J. Swaby. Members stood in silence as a token of respect.

NOMINATIONS FOR OFFICE-BEARERS, 1938-39

The following nominations were received:—

President.—Mr. R. H. Croll; proposer, Mr. E. E. Pescott, seconder, Mr. A. S. Chalk.

Vice-Presidents.—Mr. J. W. Audas; proposer, Mr. S. R. Mitchell; seconder, Mr. A. R. Proudfoot. Mr. A. S. Chalk; proposer, Mrs. C. L. Barrett; seconder, Mr. A. R. Proudfoot. Mr. E. E. Pescott; proposer, Mrs. Sarovich; seconder, Mr. A. S. Chalk. Mr. Geo. Coghill; proposer, Miss J. Raff; seconder, Mr. C. L. Barrett.

Treasurer.—Mr. J. Ingram; proposer, Mr. A. S. Chalk; seconder, Mr. F. S. Colliver.

Librarian.—Dr. S. C. Sutton; proposer, Mr. E. E. Pescott; seconder, Mr. A. R. Proudfoot.

Assistant Librarian.—Mr. W. H. Ingram; proposer, Mr. C. Croll; seconder, Mr. A. S. Chalk.

Editor.—Mr. C. L. Barrett; proposer, Mr. E. E. Pescott; seconder, Mr. G. N. Hyam.

Secretary.—Mr. F. S. Colliver; proposer, Mr. W. H. Ingram; seconder, Mr. G. N. Hyam.

Assistant Secretary.—Mr. L. W. Cooper; proposer, Mr. H. Jenkins; seconder, Mrs. C. L. Barrett.

Committee.—Mrs. C. L. Barrett, Messrs. S. R. Mitchell, G. N. Hyam, A. S. Kenyon, H. C. E. Stewart, H. P. Dickens, I. C. Hammett, H. Jenkins, A. C. Frostick, J. H. Willis.

Messrs. Chas. Croll and A. G. Hooke were duly elected as auditors.

SUBJECT FOR THE EVENING

A lantern lecture on "The Use of the Natural Colour Film as an aid to Nature Study" was given by Mr. F. Lewis, Chief Inspector of Fisheries and Game. Many excellent studies of birds and animals, as well as plants, taken on natural colour films were shown; also a large number of uncoloured slides illustrating erosion by wind and water at Cape Woollamai, Phillip Island, and the Department's successful efforts to stay the march of the dunes by planting marram grass.

CORRESPONDENCE

From the Federation of Melbourne Walking Clubs, thanking the Club for promised help in the matter of private huts on Crown land.

Mrs. G. S. Renton, c/o Box 2, Williamstown, regarding a collection of named insects, water colour paintings of fungi, etc., for sale.

Miss E. Fankhauser thanking the Club for a letter of sympathy in her recent bereavement.

Miss J. Galbraith thanking the Club for expressing sympathy with her in bereavement, the tragic death of her brother.

Miss C. Currie referred to Mr. Littlejohn's article in the April *Naturalist*.

REPORTS OF EXCURSIONS

Excursions were reported on as follows:—Yackandandah, Mr. H. C. E. Stewart; Kalorama to Montrose, Mr. Barkla and Mr. Hyam

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members:—Miss M. Strongman, Miss A. L. Clarke, Miss A. R. Bouchier, Miss L. P. Schroeder, Miss Young, Mr. and Mrs. T. B. Dodds, Messrs. W. T. Charles, J. C. Gardiner and R. B. Arnott. As country members:—Mrs. McCoy, Messrs. W. J. Dempsey and M. A. K. Nilan. As associate members:—Masters N. A. Wakefield and Selwyn Baker.

GENERAL BUSINESS

Wild Nature Show.—The Secretary reported that the St. Kilda Town Hall had been engaged for October 4 and 5, 1938.

Grampians Reservation.—Mr. A. D. Hardy spoke on the matter, and Mr. G. N. Hyam gave an account of the present position in connection with the National Monuments scheme.

EXHIBITS

Mrs. Thom (Kowat), per Mr. G. N. Hyam:—Unusually large phyllodes of *Acacia implexa* (9 ins. long by 1½ ins. wide), from adult tree in Kowat district.

Mr. H. T. Reeves.—Red Cap Guni (*E. erythrocorys*) of West Australia.

Mr. E. E. Pescott.—Cultivated flowers of *Hakea laurina*, R.Br. (Syn. *H. eucalyptoides*, Maissn).

Mr. C. J. Gabriel.—Marine shells from Japan, *Latiaxis japonicus*, Dunker; *L. mawae*, Gray; *L. lischkeana*, Dunker; *L. spinosus*, Hirase; *L. deburghiae*, Reeve. Also land shells (*Paryphanta rumpacta*, Cox and Hedley), from Lorne.

Mr. T. S. Hart.—*Persoonia lucida* (Shining Creeper), new for Victoria. This plant has been collected by Mr. W. Hunter, west of Genoa and at Mallacoota. Perhaps rare, as only one tree was seen at each place.

Mr. H. C. E. Stewart.—Red-stem Acacia (*Acacia rubida*), also geological specimens collected on the Easter excursion to Yackandandah.

Mr. F. S. Colliver.—Tertiary fossils from Aldinga, including Brachiopods, Polyzoa, Worm Tubes, Crinoids, Sea Urchins, Mollusca, specimen of Chalcedony and shells replaced by this mineral, and also land shells from the same locality. Specimen of a recent Crinoid.

Miss C. C. Currie, Lardner, in a letter to the Hon. Secretary, says:—Please congratulate Mr. R. L. Littlejohns on his successful recording of our bush at night. You will understand that I have lived in the bush all my life, without any nervousness, certainly not of the wild creatures. Is it not a pity that the progress of Time has spoilt this "comfort" of the bush, but motor cars and the greed of men have made it impossible to enjoy the native animals now. In our little piece of timber and bushland, with all our care, the last Wallaby, a beautiful big one that came near the house, was taken by five men with five dogs after nine shots, recently. There are a few Opossums, but they'll go now. Opossum is the fashionable fur, and even Native Bears will not be safe from these suburban hunters.

Two black (blue) Satin Birds have returned this year and two "green" ones. It is a long time since there were so many (no Shirley poppies for us this year). As they have only arrived (very hungry) they are still hard to see, though both blacks are friendly to each other, and come to the door for pieces. By the way, birds will not eat cheese for me. Cake first, butter, dripping, and bread; but not cheese. And we have so many come any day—Striated Tits, Wrens, Scrub-Wrens, Blackbirds, Harmonious Thrushes, Magpies, the Bower-birds, and occasionally a Ground-bird. Blackbirds and Blue-tongued Lizards cleared our garden of shellback snails completely.

NEW NOTES ON THE AUSTRALIAN MOUNTAIN GRASSHOPPER

(Acridopesa reticulata)

By EDITH COLEMAN

The life processes of the Mountain Grasshopper (*Acridopesa reticulata*) make a fascinating story. Both male and female are wonderful examples of protective colouration. As a mimic, when disturbed, the female has few equals.

Motionless, her drab body appears to be part of the brown earth or dead leaves among which she seeks concealment. An accidental touch betrays her. With uplirred elytra, she now resembles a huge wasp of formidable mien. Her stout abdomen, with its vivid red and blue bands, is unmistakably labelled "dangerous"; she threatens to use a sting which she does not possess. As she rises on tiptoes and arches her back, the challenge is repeated in a swollen, orange-yellow "collar." On the inset inner surface of her hollow elytra, seen only when raised in challenge, are four dark, eye-like spots which repeat the warning conveyed by her wasp-like colours. Reassured that no danger threatens her, she lowers the brown elytra and resumes her leaf-like camouflage—a passive defence unsurpassed by that of any creature known to me. Except to the practised eye, she now appears to be no more than a small clod of earth, or two crumpled autumn leaves.

Although the male shares the female's habit of erecting the elytra, to expose less vivid colours, he has not her formidable aspect to intimidate his foes, nor does he play her trump card of simulating death. Instead, his wings carry him to better concealment on branch, or tree trunk where his identity is lost in a colour harmony that usually baffles detection. To discover his whereabouts one must track him, generally at dusk, by following the direction of his short, clicking, *cri de coeur*.

The Mountain Grasshopper differs from all other members of the Order (*Orthoptera*) in the female being wingless, in the shape of her hollow elytra and their prominent, rugged reticulation. These cover no flight-wings, as in other Grasshoppers. They are merely colour-covers. When closed, their concavity fits snugly over the convexity of her abdomen. It is these close-fitting, shell-like elytra which give her a beetle-like appearance. It is not surprising that she is often called "Jewel-beetle," for she has a beetle-like habit, when disturbed, of dropping from the food-plant to the ground, there to simulate death, or to adopt her wasp-like posture. As she slowly walks away, her slender, cushioned feet make queer little patterns in the sand. Her face, always bent earthwards, is mask-like—grotesque. Her long, flexible antennae

seat of the organs of touch and scent, move incessantly, now waving in the air, now gently tapping a leaf. Doubtless these also serve to detect sounds, although her chief organs of hearing are on the forelegs, where, in a widening of the tibiae, are eye-like openings, covered with taut membrane, which serve as ears. As she daintily holds a leaf between her fore-feet, her palps are in endless motion. It is easy to believe that in these lie organs of taste.

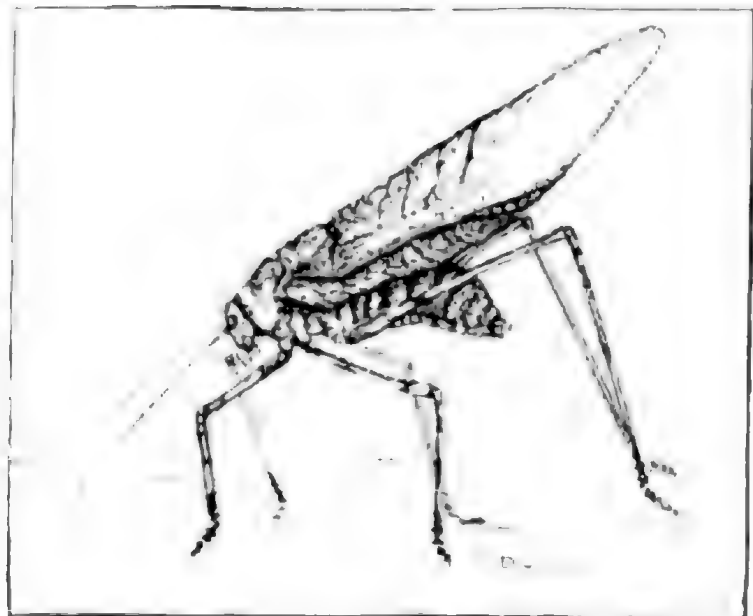


Fig. 1.

Both "Mountain" and "Grasshopper" are misnomers for, in Victoria at least, these curious creatures are more numerous in coastal areas than on the hills. I can find no record of their feeding on grass, nor of their hopping over grasslands. Indeed, except in the earliest stage, although they possess leaping posterior legs, they do not hop at all. In the past six years, probably longer, they have been very numerous in the Tea-tree undergrowth from Rye to Sorrento, where they feed on an all-too-abundant, introduced Ragwort (*Senecio*). What their original food was I have not been able to discover. In captivity, although they accept sweet-corn, lettuce and other salad-greens, Ragwort is always preferred. At Sorrento I have seen them feeding on nothing else, although they are frequently found on bushes of the Coast Rice-flower (*Pimelia elechantha*).

They do not move at night but rest, spider-like, head downward, on stems of the food plant, or on the walls of their enclosure, feeding only in early morning or late afternoon. At Sorrento, although they are seen at all hours of the day they are most active between 8 a.m. and 11 a.m., and in the early evening. Nymphs of both sexes, and adult females, may be seen on sunny days crossing a main road—probably "changing pastures," seeking mates or sheltered positions for oviposition. In warm sunshine the adult females lie on one side, basking like birds. Male and female nymphs are easily distinguished by the small, fin-like wing pads: one blunt pair (female) which enclose the coming elytra, or two pairs (male), the blunt pair enclosing flight-wings and the more pointed pair enclosing elytra.

Adult males are sometimes seen on roadside vegetation, but only very rarely on the road. These have fully developed flight wings, covered, when at rest, by long, pointed elytra (nearly three times the length of the body) which are very autumn-leaf-like, both in colour and venation.

In other years males have not been numerous at Sorrento. This season (November, 1937-April, 1938) scores were seen, feeding on Ragwort or making occasional short flights from weeds to bushes—a characteristic Grasshopper flight, sustained for only about 40-60 feet before the insect dropped into a low bush. Whether, in travelling, they fly higher I do not know, but I have never seen them rise above the Tea-tree. I think it probable that they do not travel far, but die, having served their purpose near their "cradles." Large numbers of males were seen, head downward, on stems of Ragwort, well hidden by foliage. They were heard long before they were discovered. In early morning, or late afternoon, there was an air-filling chorus of their tiny call notes, Cicada-like, but not so shrill.

From eggs, deposited in summer, small ant-like young appear in the following spring. The first skin is probably shed, and eaten, on emergence from the egg. Unfortunately, I have missed this stage. My smallest specimen (January 19, 1938) was 7 mm. in length and was without visible wing-buds. It died three weeks later without change of form. Another small nymph, 10 mm. in length, a male, had small wing-buds. These had dull, orange bands, but no blue dotted lines.

In the case of the smallest of my nymphs the orange collar was not seen. Many larger nymphs, in various sizes, possessed wing-buds. On these the orange bands were well-defined, but there were no blue bands. The smallest nymphs give little jumps when disturbed, probably corresponding to the "hopper" stage of the field Grasshoppers. They grew rapidly but did not again moult

until ready to complete their gradual metamorphosis by the withdrawal of fully developed elytra and wings.

Thus there are at least two moults in the nymphal stage, exclusive of one which, I suggest, may take place on emergence from the egg. Because of their habit of eating cast skins, it is possible that I may have overlooked other moults, but I think, in that case, I should have discovered a "mask" or two, or an odd leg which had not been devoured.



Fig. II.

Usually the final moult took place in early morning or evening when light was too poor for photography. The photographs on page 29, which show two stages in the ecdysis of a female, were taken at 6 p.m. (3/2/38) with a slow lens. For one of them, the shutter was opened three times.

By chloroforming several specimens at different stages, I was able to obtain other pictures in better light. It was by no means easy, because, during the process, the spiracles do not appear to function until ecdysis is almost completed. Even by increasing the amount of chloroform it was difficult to arrest the process at a desired stage.

OVIPOSITION

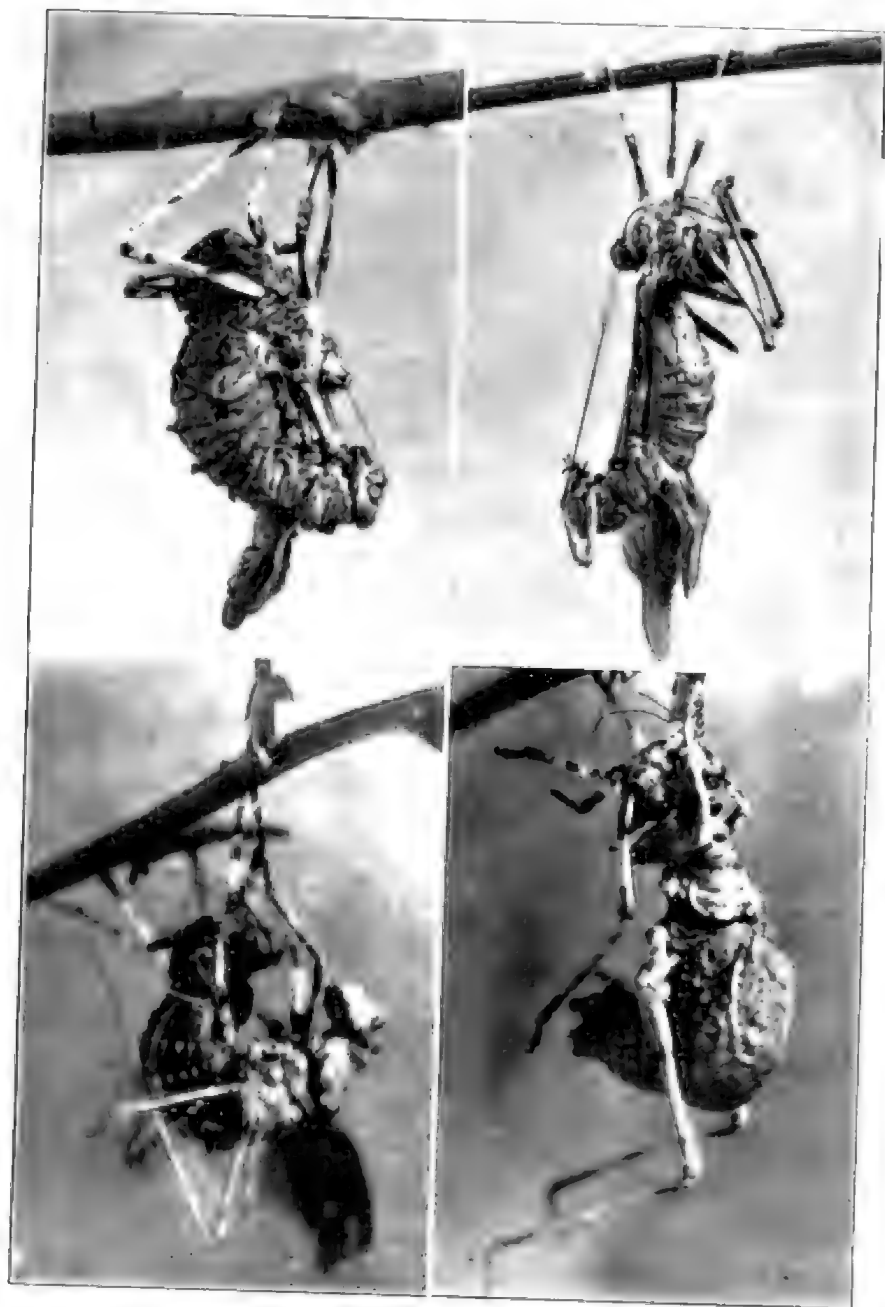
To oviposit, in captivity, the female Grasshoppers mount to the roof of their enclosure, merely leaving the eggs, as one might expect from the small ovipositor, on the surface of the muslin which covers the roof. As they are never deposited on the small bushes, 12-24 inches high, within the cage, I assume that this is a heliotropic response, and that, in normal circumstances, we may look for the eggs fairly high up on trees or shrubs; but I have never found them. If deposited on green food-plants they would probably be eaten, or dislodged, by those that have not yet completed their growth. Moreover, the Ragwort dies down at the end of summer. The eggs are covered with a viscid exudation which hardens on exposure to the air, and by which they adhere firmly to the muslin roof of the cage. Doubtless it serves to make them weatherproof. I have placed eggs in various situations, hoping to see the emergence of young. In other seasons the eggs of my captives have appeared to be infertile. The females were doubtless imprisoned before they had mated. This season males and females were enclosed in a large cage which permitted flight for the males.

At Sorrento the Grasshoppers disappeared earlier this year than is usual. Two only were seen on April 8 and 9. I have had them as late as May 15 (1935), but this year the last of my captives died on April 10. As one expects, the males die first. Death appears to come easily. After ceasing to eat, the Grasshoppers pass into a lethargic condition from which they do not awaken.

METAMORPHOSIS OF THE MOUNTAIN GRASSHOPPER

The camouflage and mimicry of the Mountain Grasshopper are certainly remarkable, but one is without words to adequately describe the wonder and the beauty of the final stage of their gradual metamorphosis. It must be seen to be appreciated. I have watched the process many times with almost breathless amazement. Each time some phase has been revealed which my eyes had missed previously. When nearing its final moult, the Grasshopper rests for awhile without eating, becoming very dark in colour. It then grows restless, wandering from its food plant in search of a satisfactory situation for this great undertaking.

Choice of site appears to be a matter of great moment. It is usually in a space between two twigs in which the insect may swing without touching leaf or twig. It may spend an hour or more in making tests. The process is certainly facilitated by an accommodating position, so much so that it suggests that choice of site is a matter of discrimination, rather than a blind response



Figs. III, IV, V and VI.

to instinct, or some subtle tropism. Having made its choice, the insect clings to a twig, hammock-wise, by its first and second pairs of feet—upside down, wing-buds held away from the abdomen and pointing downward, its posterior legs swinging and kicking in the open space, its antennae very restless.

Every limb is exercised in turn. A little moisture exudes from the mouth. The body becomes much brighter in colour. The head moves up and down, so that the orange "collar" is alternately visible and invisible. The usual heavings and contraction take place. In half an hour the head, now a mere mask lying on the chest, is seen to be contracting towards the clinging feet. It is really rather gruesome to see the old head disappearing thus from its original position. One usually misses the lesion, for the old skin and the new one are, at this stage, nearly of one colour.

The old skin has now reached the twig. In the case of a female, what appear to be two small flaps of loose skin are seen lying flat on either side of the body. These now fall and hang limply, like wings of a tiny bat. It seems impossible that these crumpled processes can be elytra, yet, in a few moments, they begin to take shape. The old wing-buds, like small, dark fins, are close to the clinging feet. The body stretches, and on each side of it three new legs, in perfectly straight lines, are withdrawn simultaneously from the old, still bent, legs, just as one might withdraw one's arms from the sleeves of a coat. The body now stretches violently backward, almost vertically, head downward, as it strains to release the tips of the longest legs. The new antennae are almost free.

The emerging body is beautiful in vivid sunset colours, translucent, glowing like a lamp in the dusk. The tip of the abdomen moves from side to side. The liberated legs wave wildly and become bent. The body heaves again and, with a great effort, the fore feet suddenly rise to catch hold of the old skin, so that the body is now curved into almost a half circle. There is at this stage no attempt to free the apex of the abdomen, for this horizontal position apparently facilitates expansion of the elytra, which, although still hanging limply, are growing in size. There are more vigorous heaves of the shrimp-like body. The elytra, now wider, hollow and of a warm biscuit colour, are almost fully expanded. The dotted blue bands have appeared. One more great effort and the tip of the abdomen is free, but the Grasshopper still clings in the horizontal position until the elytra have completed their expansion. They are now quite shell-like, their eye-like spots appearing as dark, green shadows.

A moment passes, and the elytra suddenly spread, then close closely over the abdomen, completely covering the bright colour-bands. The Grasshopper now drops vertically, head-up, swinging

by its fore feet. The long posterior legs kick violently, then remain still for a while. Except in colour, which is of pale, greyish shades, she is fully adult. Suspended thus for an hour and a half, she makes a meal of her cast-off skin! A leg is bitten off and held, like a pipe, in her mouth. She munches away until nothing is left but the mask and perhaps portion of a leg. This gruesome



Untouched, shed skin of male, from which he was removed before commencing to eat skin.

meal has probably a medicinal value. To test it I removed two shed-skins before their owners could devour them. I noted no ill-effects.

After removing the shed-skin of one female, I gave her another, shed twenty minutes earlier by another female, but she did not touch it. Once a shed skin fell behind the eater. Reaching over backward with two feet, she raked it to her, and finished, leg by leg, her strange meal.

The metamorphosis of the male is even more beautiful to see. As he clings upside down from his twig there are four, instead of two, outspread wing-pads pendent from his body. The elytra that presently fall are so small and so limp, one marvels that they should ever expand to their great adult size.

As soon as the tip of the abdomen is free, a final heave is given to the flight-wings, which spread suddenly. We are not accustomed to see these beautiful lace-like wings for, except in flight, they are covered by the brown, leaf-like elytra. But here they are outspread for our delight. Both elytra and wings still droop limply from the body, but, having reached their full expansion, they suddenly close to the sides of the abdomen.

As the flight wings are not yet folded, fanwise, under their covers, we may enjoy their beauty a little longer. At this stage the Grasshopper looks like a fairy, in palest shades of fawn and buff, head and abdomen of a warm brown, his orange and blue bands quite clear.

Five minutes later the flight wings are suddenly folded and hidden away. Our Grasshopper rests for a moment or two, then, *reaching for his old skin, he makes the first meal of his adulthood!* With both males and females, the time taken to complete the final ecdysis varies from 85 to 105 minutes.

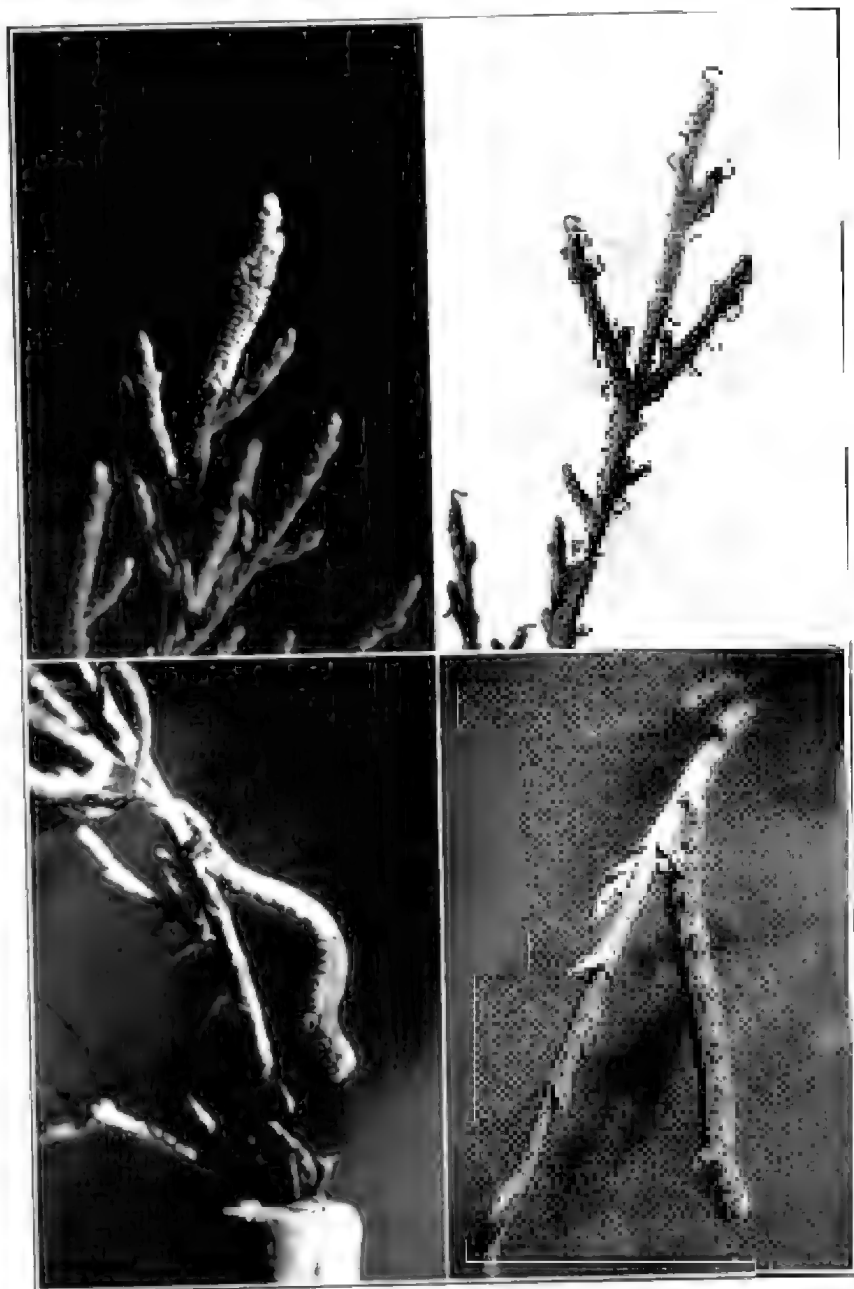
Even writing at such length, the story is only half told. Many interesting features have been omitted, for space has had to be considered. A more complete story may be enjoyed, at first hand, by those who care to domesticate a few Mountain Grasshoppers.

ACKNOWLEDGEMENT.—I am indebted to Mrs. C. Storey, of Ivanhoe, for printing two of the illustrations from under-exposed negatives. It is owing to her skill that they are clear enough for reproduction. The photographs are not re-touched in any way.

KEY TO ILLUSTRATIONS

- I.—Adult male, typical attitude.
 - II.—Fully grown nymph (female) in position for final moult.
 - III.—Nymph (female) with legs nearly free, old skin contracted towards the twig, elytra pendent, limp, unexpanded: old head disappearing towards clinging feet.
 - IV.—Nymph (male) with body thrown backward in order to free tip of feet and antennae. Note the old wing-buds, like fins, attached to the old skin. Antennae almost free. The old ones seen curved between old, posterior legs.
 - V.—Female nymph, almost out of old skin, has risen to catch old skin between new fore-feet, remaining in this attitude until her elytra are fully expanded.
 - VI.—The same as in V in final position, with closed elytra. In this attitude she swings for 90 minutes while eating her old skin.
- Numbers III and IV untouched chloroformed specimens. A little clay was dropped on the feet to hold them securely while the limp, swinging bodies were carried away to photograph.
- Numbers V and VI an unchloroformed specimen photographed in two stages. For V the shutter was opened and closed three times when the insect moved.

Plate IV



Figs., I, II, III, and IV

AN INHABITANT OF THE CYPRESS HEDGE

By B. BLACKBURN

In the months of May and June owners of Cypress hedges may notice that some of the tips of the young shoots appear as if encrusted with minute pearls. These are the eggs of a greyish moth known scientifically as *Chlemias zonae*, whose larvae feed on Cypress. When first laid these eggs are very conspicuous, but in two days turn a bluish-green and are then less likely to catch the eye of a hungry bird.

A day or two before hatching, which takes place a few weeks later, the young caterpillars can be clearly seen curled up within the eggs. Immediately after hatching, the caterpillars are extremely



Fig. V.

active and rapidly disperse in all directions, soon disappearing from sight owing to their minute size and protective colouration. They are "loopers," with legs "fore and aft," three pairs near the head, and two pairs at the back; five pairs in all, instead of the usual eight pairs of the normal caterpillar. They are also commonly, although erroneously, called "stick insects" because, when resting, they stand out at an angle from a twig with their bodies perfectly rigid, and in that position much resemble a piece of their food plant.

When the caterpillar is resting in its characteristic attitude, stretched out perfectly straight, and holding on by its two pairs of hind legs, it might naturally be supposed that the muscles were undergoing a considerable strain. If, however, it be examined closely, a strand of fine silk will be seen stretching from beneath the head direct to the twig and acting as a support to that end of the body. This strand of silk proceeds from a gland beneath the



FIG. V I.

lower lip of the caterpillar, and is also used as a rope by which the insect can lower itself when dropping from the twig, a habit it has when suddenly disturbed. The young caterpillars frequently spend the night suspended in mid-air by this silken thread.

Full grown, the caterpillar, which reaches a length of two inches or more, is a really beautiful object, especially if examined with a pocket lens. It is striped with bright yellow, the lines being interspersed with hieroglyphic-like markings of black, green, white, and blue. The head is jade green covered with minute black spots, and

altogether is one of the handsomest of Australian "loopers." Along the sides a row of black oval spots can be seen. These are the spiracles or openings through which the insect breathes, and which are supplied with a filtering apparatus to prevent pieces of dust, etc., getting into the air passages. In such a brilliant livery one would expect the caterpillar to be a conspicuous object. In reality, the colours blend so wonderfully with the lights and shades of a Cypress hedge that some little practice is needed to detect it readily.

When fully grown the caterpillar leaves its food-plant, burrows into the ground, and there spins a silken cocoon in which it changes into a chrysalis. A grey moth with black markings later emerges and pushes its way up through the soil. Its wings appear small and shrivelled, but while the moth rests, hanging from some support, the blood flows into them until they are fully expanded and dry. The moths may commonly be found resting on fences during the day, while at night they will often fly in at open windows, attracted by artificial light.

EXPLANATION OF ILLUSTRATIONS

I. The pearl-like eggs of the moth on a young shoot of Cypress. Considerably enlarged. About 200 are laid in each cluster.

II. Newly hatched caterpillars. These little creatures were very lively and had to be chloroformed to keep them still long enough to be photographed.

III and IV. Full grown caterpillar. Note the silken thread stretching from the lower lip to the twig. When disturbed, the insect drops off and lowers itself by the silken rope.

V. The moth of the Cypress hedge (*Chlenias zotac*), grey with black markings.

VI. One of the spiracles, magnified one hundred and fifty times, through which the insect breathes. These open on the surface of the skin and would get choked with dust and dirt if not provided with the wonderful filtering apparatus shown in the photograph.

FOSSIL COLLECTING

If you have never collected fossils you have not experienced one of the thrills of life. Go to the big quarry at Wandong, break up sandstones and mudstones; and one blow of the hammer may reveal the head of a large trilobite. On each side of the head there is a turret, and on the outside of each turret you can clearly distinguish a number of eye facets. A marvel of Nature which has been sealed up in stone for, possibly, one hundred million years.

Many people now have motor cars and they do not know where to go for a run; suppose you take a short trip to Mornington, and then go four miles further to Fossil Beach. At low tide there is exposed clay, marl, or limestone beds at the base of the cliff. These contain abundance of fossil shells, indicating the life of Middle Tertiary, or thereabouts. The digging is easy, and one day, to my delight, I unearthed a beautiful Pearly Nautilus.

If you have a car, go to the Grampians. At Dairy Creek Falls, near Hall's Gap, there is a series of fine-grained rocks which should certainly be carefully searched for fossils. Two minute forms, a fish scale and a shell, are all that have been gathered from this grand mountain mass. Once, when walking from Mafeking to the cairn on Mt. William, along little hills I called the Don Range, and on the underside of a big slab of sandstone, I saw the markings made by some crawling creature; that place is well worth searching.

Perhaps you are a novice; well, watch the daily papers for the time of low tide, and go to the beach at Beaumaris; you are sure to find a fossil starfish, somewhat like a button, and possibly a tooth of a shark which may have been anything from 20 ft. to 80 ft. in length. Up the Tambo to Bindi, especially in wattle time, is a beautiful motor run. There fossils are weathered from the supposed Devonian limestones and spirifers can be gathered in dozens. If you like a long car ride and do not object to a tramp, go to Limestone Gap at Wombat Creek, a tributary of the Upper Mitta Mitta River: a grand place for Silurian fossils.

At the mouth of the Wombat there is a fine cliff where the river has cut through a striking band of limestone. Get fossils there and help to clear up the mystery of the age of these limestone bands. West of Wombat Creek at Limestone Gap, a creek comes in; here I searched for an hour and got some trilobites which, I think, have not been identified. More search is required here. If two or three companions could go to Heathcote, and then a few miles north to near the Lady's Pass, and sink a hole on the clay bed there, and get fossils, trilobites, etc., including *Notasaphus fergusonii*, they would help definitely to establish the Cambrian in Victoria.

In Victoria good fishing is hard to get, except rabbits and an odd hare, what is there to shoot? So why not hunt the creatures which lived when the world was young, have an exceedingly enjoyable time in the open, and help to extend our knowledge of Australian geology? There are bones projecting from the sandstone on the cliffs at Kilcunda; and near the Eagle's Rest at Inverloch I found the toe of a reptile and teeth of *Ceradotus*, the wonderful lung-fish of Queensland. The rocks here are Jurassic, yet a fish of this type still swims in two of Queensland's rivers. At Waratah Bay (the possible extension south of the Great Barrier Reef yields copious fossil corals.

W. H. FERGUSON.

"THE FLORA OF THE FAR NORTH-WEST OF VICTORIA."

Under the above title a typescript brochure has been issued by the Forests Commission of Victoria. There are 86 pages and 10 illustrations, and the author is a well known botanical member of the Field Naturalists' Club, Mr. W. J. Zimmer, *informer*, Chief Forester for the Mildura district.

Mr. Zimmer has produced a "local" flora complete, and with a new outlook, dealing with the "distribution of the flora in relation to soil types and its value in the prevention of soil erosion." Thus, in addition to its ecological value, the book is an important contribution to a modern urgent problem.

The author has divided the vegetation into five types, the soils supporting the vegetation having been grouped into four main divisions. Soil profiles to a depth of five feet are shown, and the relationship between the vegetation types and soil divisions has been discussed. Reference is also made to the value of plants as soil indicators, and valuable and complete lists have been prepared showing the number of plant species in one, or in more than one, soil group.

The effect of settlement on vegetation and soils is also discussed. The author here shows that the Cypress Pine of the genus *Callitris* will not tolerate the isolation caused by the clearing of the ground for the production of wheat. Having been accustomed to associated protection, the trees soon die when faced with extreme exposure. This has an important bearing on the supply of Cypress Pine timber, a valuable building timber for these districts. For the same reason, many plants are now quite uncommon and are becoming rare. This is a case where some district reservation in which these plants occur is necessary so that they shall be preserved for posterity. Many of the rare plants mentioned in the list are very interesting, and an effort should be made to save them.

The relation of plant life to soil erosion is well known, and Mr. Zimmer here supplies a full account of the causes of this national loss.

A complete list of indigenous plants found growing in these areas is given, with indications as to their rarity and their occurrence on the various types.

The book is distributed free on application, and the issue is limited. It can readily be stated that this is possibly the best local "flora" that has ever been issued for the State of Victoria; and many more such works would be heartily welcomed.

E. E. PESCOFF.

The Victorian Naturalist

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July 7, 1938

No. 655

THE FIELD NATURALISTS' CLUB OF VICTORIA

The Annual General Meeting of the Club was held at the Royal Society's Hall on Monday, June 13, when the Senior Vice-President, Mr. Geo. Coghill, presided over a large attendance of members and friends.

The election of officers for 1938-1939 resulted as follows:—President, Mr. R. H. Croll; Vice-Presidents, Messrs. Geo. Coghill and A. S. Chalk; Treasurer, Mr. J. Ingram; Librarian, Dr. C. S. Sutton; Assistant Librarian, Mr. W. H. Ingram; Editor, Mr. C. L. Barrett; Secretary, Mr. F. S. Colliver; Assistant Secretary, Mr. L. W. Cooper; Committee, Messrs. A. H. Chisholm (ex officio as Past-President), G. N. Hyam, H. C. E. Stewart, E. E. Pescott, S. R. Mitchell and Mrs. C. L. Barrett.

The annual report and balance sheet were presented and adopted. These are printed elsewhere in this issue of *The Victorian Naturalist*.

CORRESPONDENCE

From Mrs. W. Champion Hackett, thanking the Club for its letter of condolence.

From the Secretary of the Lord Mayor's Flower Day Appeal thanking the members for their assistance.

From the Victorian Aboriginal Group and the Town Planning Association inviting members to their respective annual meetings

REPORTS OF EXCURSIONS

Mr. A. C. Frostick, on behalf of Mr. F. S. Colliver, reported on the excursion to the Royal Park Cutting, and also gave a short preliminary report of the excursion to Torquay, from which some of the members had not yet returned.

ELECTION OF MEMBERS

On a show of hands the following were elected:—As ordinary members, Mr. E. H. Shewan and Mr. Reginald Burston; as a country member, Mr. J. Hatchell Brown, and as an associate member, Master Jack Woodburn.

NOMINATION

Mr. John Martin, of 27 Brook Crescent, Hawthorn, was nominated as an ordinary member.

SUBJECT FOR THE EVENING

A lecture on the subject, "The Alluring World of Fungi," was given by Mr. J. H. Willis, of the National Herbarium. This was illustrated by many beautiful coloured lantern slides and projections by the epidiascope. The lecturer dealt fully with the various forms of Fungi, from those of microscopical size to the large *Boletus*, and showed the effects, physiological as well as economical, on both plants and animals.

EXHIBITS

Messrs. J. H. Willis, H. C. E. Stewart, and A. A. Brunton each staged large exhibits of fungi, illustrating the lecture.

Mr. Crosbie Morrison showed a twin mushroom from Lancefield, two geasters and a photo. of a large *Boletus*.

Mr. V. H. Miller.—Two Bird Houses, and two Orchids in bloom, namely *Cypripedium villosum* and *Cyp. Charlesworthii*.

Miss A. Cornish.—A Long-horned Locust from Ringwood.

Mr. Geo. Coghill.—Flowering stalks of the Grass-tree.

Mr. V. H. Miller.—Fungi collected at Beaconsfield, including *Cantharellus lilacinus*.

Mr. E. E. Pescott.—Young specimens of Fungus, *Pholiota spectabilis*, parasitic on *Grevillea robusta* (Silky Oak).

Mr. H. Stewart.—Fifty species of Fungi collected at Sherbrooke Forest, including *Tremellodendron gelatinosum*, a species not hitherto recorded for this locality.

FIFTY-EIGHTH ANNUAL REPORT, JUNE, 1938

To the members of the Field Naturalists' Club of Victoria.
Ladies and Gentlemen.

Your Committee has pleasure in submitting the fifty-eighth annual report.

The membership is as follows:—Life members, 5; Honorary members, 4; Ordinary members 231; Country members, 68; Associate members, 22; total, 330; this being an increase of 13 on the figures of the last report.

We record with sorrow the death of the following Club members:—Mr. J. H. Harvey (1905-1938), Mr. Hugh Hughes (1918-1938), and Mr. Champion Hackett (1928-1938). Prof. Ewart and Mr. C. Lambert, one-time prominent Club members, also passed away during this year.

Attendances at the meetings have been well sustained, the seating accommodation having been fully taxed on most occasions. The second room is still in use for the display of exhibits, some of which have been of great interest.

Nature notes have been given from time to time, and many questions asked at the meetings.

All of the meetings this year have been held in the Club rooms, at the Royal Society's Hall, and the Epidiascope has been used to illustrate the various lectures and notes.

The following was the programme of lectures for the year—Presidential address on "Crystals," by Mr. S. R. Mitchell; "The Ice Age in New Zealand," by Mr. F. A. Singleton, M.A.; "With Scott in the Antarctic," by Capt. Gerald Doolley; "Aboriginal Art," by Messrs. A. S. Kenyon, M.I.E.Aust., and C. L. Barrett, C.M.Z.S.; Donald MacDonald Evening with Sir Edward Cunningham as chief speaker; Snake Symposium, with various speakers and questionnaire; "Crustacea," by Miss Ellen Clarke; Symposium on Household Pests, speakers being Miss E. Lindsay and Messrs. G. N. Hyam, R. Pescott, and C. French; "Mountain Tribes of Papua and New Guinea," by Mr. E. W. P. Chinnery; "Introduction of the Australian flora to the Old World," by Mr. E. E. Pescott, F.L.S., and "The Natural Colour Film as an Aid to Nature Study," by Mr. F. Lewis.

The December meeting again took the form of a social evening, and was enjoyed by the members.

The "order of business" is still so arranged that the lecture for the evening is second on the agenda, and this idea still remains popular.

During the year numerous excursions were held, several were cancelled for various reasons, and some created records in attendance. Recently the excursions have been better attended, but it seems possible that a reduction in number may be an advantage.

Volume LIV of *The Victorian Naturalist* has been completed, and is up to the usual standard. The Committee still aims to increase the number of pages and illustrations. Again many papers of popular and scientific interest appeared in the volume, and similar papers are hoped for this year. Our journal is still the leading publication of its kind in Australia, and it is the constant aim of the editor to make it even more comprehensive and valuable. That it fills a place in scientific literature is shown by constant demands for it from overseas.

The Club continues its activity in the matter of preserving the wild life of Australia, and from time to time members have reported to the Committee various breaches of protection Acts, acts of vandalism, etc., and these have been referred to the proper authorities.

Matters that have been inquired into include:—Destruction of the Golden Water Rat, Importation of Californian Quail, Picking Wild Flowers on Grampians Tours, Pound Bend as a Sanctuary, Shooting of Wild Duck, Destruction of Orchids in Cann River Valley, Tree Cutting on State Highways, Interference with Penguins at Phillip Island, Destruction of Pelicans, Netting of Native Birds, etc. The Committee has also been concerned in the matter

of obtaining a more adequate representation locally of our native trees and plants.

Suggestions have been made during the year for further protection of native birds, so far with little result. We record, however, that there was no open season for Ducks this year, and your Committee congratulated the Fisheries and Game Department on their action.

The sub-Committees have had little to do this year, being more or less merged in with the National Monuments movement, and here we record a growing interest, with more definite steps taken in the matter.

Members are again asked to advise the Committee of any objects or places they consider worthy of proclamation as "National Monuments" if the necessary legislation is obtained.

We record with pleasure that increased areas of sanctuaries have been granted this year. Mallacoota, Wyperfeld, and Cumberland Sanctuaries are now bigger, and an additional new area at Dead Cock Creek has been proclaimed.

A field day was held at Sir Charles Belcher's old home in the Geelong district to assist the Geelong Town Planning Association in their endeavour to have the area reserved as a National Park. The Club's work and reports were greatly appreciated, and were given prominence in the Geelong press.

The Club is interested in the proposal to proclaim the Grampians a national forest, and also in the possibility of being represented on the committee of the Wilson's Promontory National Park. We are represented on the Council of the League of Youth, and are members of the Horticultural Council of Victoria and of the Australian and New Zealand Association for the Advancement of Science. During the year we have combined with various bodies to protest against the erection of huts on Crown lands, and to prohibit the use of pea rifles, etc.

Members of the Club attended special meetings of the Bird Observers' Club and of the Entomological Society. Delegates were appointed to, and attended, the Mt. Arapiles celebrations, and also the Federation of Melbourne Walking Clubs' combined gathering. At this last mentioned function a Club member gave the address. The following societies were assisted at their annual shows:—The Rangers' League, North Queensland Naturalists' Club, and the South Australian Field Naturalists' Club.

Several inquiries concerning the formation of Field Naturalists' Clubs were received during the year, and all the information possible was passed on.

For the first time in many years no Wild Nature Show was held, the Committee feeling that it should not be held owing to

the epidemic of infantile paralysis. This year, however, arrangements are in hand to hold the annual show, and for this purpose the St. Kilda Town Hall has been engaged for October 4 and 5, 1938.

The Hon. Librarian reports that numerous books and pamphlets have been bound during the year, and that a number of new books have been purchased. New shelving has been erected, which has facilitated the handling of books.

A photographic library has been started with Mr. H. T. Reeves as the librarian, and members having photographs of any natural history interest are asked to present copies to the library so that many valuable records may be kept.

During the year we have welcomed to our meetings overseas naturalists and members of Interstate Naturalists' Clubs, and we have had occasional visits from some of our country members.

Several interesting happenings to Club members are here recorded.—Our President, Mr. A. H. Chisholm, C.F.A.O.U., was appointed Editor of the *Argus* newspaper, but later he resigned from this position to visit England. Dr. R. S. Rogers, M.A., D.Sc. celebrated his golden wedding. Messrs. J. and W. H. Ingram returned from their visit abroad to see the Coronation. Mr. Noel Lothian transferred from Christchurch, New Zealand, to the Royal Botanic Gardens, Kew, England, to further his studies. Mr. and Mrs. E. S. Hanks and Misses H. Bailey, V. Fletcher and V. Hickman also left on visits to England.

Grateful acknowledgments are tendered to the following benefactors:—For a cash donation, Mr. J. E. Dixon; for donations of books and specimens, Mr. and Mrs. C. L. Barrett, Miss Best, Messrs Ivo Hammett, A. H. Mattingley, C. French, E. Kcep, and J. Delancey Forth.

A comprehensive expression of thanks is extended to all members and friends of the Club who have given their time and energies towards the advancement of the Club and its activities. Their reward lies in the knowledge that their efforts are of no little national importance.

During the year eleven Committee meetings were held, and the attendance of officers was as follows:—Mr. F. S. Colliver, Mr. G. N. Hyam, 11; Mrs. C. L. Barrett, Messrs. C. L. Barrett, I. W. Cooper, H. C. E. Stewart, Geo. Coghill, and Dr. C. S. Sutton, 10; Mr. A. S. Chalk, 9; Mr. R. H. Croll, 8; Mr. S. R. Mitchell, 6; Messrs. A. S. Kenyon, A. H. Chisholm, and W. H. Ingram, 5; Messrs. J. Ingram and E. E. Pescott, 4; Messrs. A. H. Chisholm, R. H. Croll, J. and W. H. Ingram were granted leave during the year.

GEO. COGHILL, Sen. Vice-President.
F. S. COLLIVER, Hon. Secretary.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR
TWELVE MONTHS ENDED 30th APRIL, 1938

RECEIPTS

Balance at Banks, 30/4/37—

State Savings Bank	£400 10 5	
E.S. & A. Bank	84 0 8	
		£484 11 1

Subscriptions—Arrears	£39 19 6	
Current	190 17 6	
In Advance	15 14 8	
		246 11 8

Cash Sales of—

<i>Victorian Naturalist</i>	10 16 4	
Shell Book	2 5 6	
Fern Book	6 15 11	
Census of Plants	1 10 3	
Badges	0 14 0	
Library Books and Furniture	2 6 2	
		24 8 2

Advertisements in *Victorian Naturalist* 2 17 0

Donation 1 0 0

Hire of Epidiascope 1 5 0

Interest Received—

“Best Fund”	1 7 8	
Fixed Deposits £200	3 0 0	
Savings Bank Current Account	7 7 7	
On Commonwealth Loan	23 4 6	
		34 19 9

Sundry Items 0 18 6

312 0 1

£796 11 2

EXPENDITURE

Victorian Naturalist—

Printing	£159 4 6	
Illustrating	68 3 10	
Despatching	5 5 10	
		£232 14 2

Reprints 3 14 6

Postage and Freight 6 19 0

General Printing and Stationery 18 4 9

Rents—

Royal Society's Hall	16 0 0	
B.O.C. for committee meetings	2 15 0	
Caretaker for Royal Society's Hall	1 10 0	
		20 5 0

General Expenses, Insurance, Bank Charges, etc. 3 1 8

Costs of Club's Conversazione 7 10 0

Library 19 11 4

Repairs to Epidiascope 5 10 0

Refund of Fern Book receipts 1 17 6

319 7 11

Purchase of steel shelving for Library 19 3 6

Investments made—			
£250 Commonwealth Bonds	248	2	6
Fixed Deposits, E.S. & A. Bank .. .	200	0	0
			<u>448 2 6</u>
Balance at Banks, 30/4/38—			
State Savings Bank	28	12	5
E.S. & A. Bank	21	2	6
			<u>49 14 11</u>
Less Unpresented Cheques	39	17	8
			<u>9 17 3</u>
			<u>£796 11 2</u>

STATEMENT OF ASSETS AND LIABILITIES

ON 30th APRIL, 1938

ASSETS

Arrears of Subscriptions, £100/15/-, estimated to realize .. .	£80	0	0
Bank Current Accounts—			
State Savings Bank	£28	12	5
E.S. & A. Bank	21	2	6
			<u>£49 14 11</u>
Less Unpresented Cheques	39	17	8
			<u>9 17 3</u>
State Savings Bank Special Trust Account ..	12	15	3
			<u>22 12 6</u>
Investments—			
E.S. & A. Bank Fixed Deposit, "Best Fund" ..	50	0	0
E.S. & A. Bank Fixed Deposits .. .	200	0	0
Commonwealth Bonds	600	0	0
			<u>850 0 0</u>
Library, Furniture and Epidiascope at insurance value .. .	650	0	0
Stock of Books and Badges, at valuation—			
Fern Books	41	6	1
Plant Census	5	0	0
Shell Books	17	14	7
Club Badges	6	0	0
			<u>70 0 8</u>
			<u>£1,672 13 2</u>

LIABILITIES

Late Mr. Dudley Best Fund	50	0	0
Special Trust Account	12	15	3
Subscriptions paid in advance .. .	15	14	8
			<u>78 9 11</u>
Balance of Assets over Liabilities .. .	£1,594	3	3
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THE VICTORIAN MISTLETOES

By T. S. HART, M.A., D.C.E.

Revisions of the Mistletoe family have considerably increased the number of species known to occur in Victoria. Field observations have added others, as well as amply supporting the distinctness of some forms previously placed under one name.

Old records, using names in a comprehensive sense, often leave doubt as to which species is intended. Among these are some in my earlier notes in the *Naturalist*. Some of these forms are not seen in the better-known localities about Melbourne. I have a fine series of specimens from Mr. Zimmer, Chief Forester at Mildura, with notes as to their occurrence. Others have also sent me specimens, and the officers of the National Herbarium have shown me many important examples.

Without repeating descriptions when these are readily available, I propose to call attention to some features which assist recognition in the field. At present host plants will be mentioned mainly when there are important differences, and as a guide to finding the Mistletoes. Some species attack many plants, both native and introduced, others are much more restricted.

The family falls readily into two great divisions—(1) the Loranthoid species, with stamens and pistils in the same flower, the flowers of all our species being conspicuous; (2) the Viscoid forms, with distinct staminate and pistillate flowers, which are of minute size.

Loranthoid Species.—Those that have versatile anthers, attached by a point at the back and freely movable are referred to the genus *Phrygilanthus* (Eichler, 1868). This genus is mainly South American, but has four species in Australia, one in the Philippines, and one or two on New Zealand, which, however, have not been found by any New Zealand botanist now living.

The name of the genus, meaning Pinch-flower, is based indirectly on a South American vernacular. The distinction by the anthers was used by Bentham without the name. The two Victorian species of *Phrygilanthus* were both included by Bentham under *L. celastroides* on the evidence he had. Foliage of both species is shown in the plate in Mueller's Key.

True *Ph. celastroides* (Sieber) Eichl. has short and broad leaves with pinnate veining. It is well named Coast Mistletoe in the *Census* 1928, as it is strictly limited to places quite near the coast, though other species also occur there.

Ph. eucalyptifolius (Sieber) Engl. has longer and narrower leaves and is "tripplinerved" (that is, with a vein from close to the base on each side of the midrib). This is the Common Mistletoe of the *Census*, frequent about Melbourne, but not common everywhere. There are also other differences, as a minute

pubescence on the flower stalks of *Ph. celastroides*, whose fruits also often show a reddish colour in part, and are smaller than the greenish and yellowish fruit of *Ph. eucalyptifolius*.

The veining is not always readily seen in the thick leaves. Both our species of *Phrygilanthus* and some of *Loranthus* form aerial roots, creeping growths along the surface of the host plant. This is useful in identifying the common Mistletoe about Melbourne, as the local species of *Loranthus* do not show it, but this is not a safe distinction in East Gippsland, as aerial roots are said to occur in *L. vitellinus*.

Both these species have a large number of host plants, but there are distinctions. True *Ph. celastroides* occurs especially on *Banksias* (*B. integrifolia* and *B. serrata*), and also on *Monotoca elliptica*. On these, I have never seen *Ph. eucalyptifolius* (the Common Mistletoe), but both occur in *Alyxia*, on Black Wattle, on *Casuarina suberosa*, and sometimes both on the same tree.

Occasionally an unusually short or broad leaf occurs on the Common Mistletoe, but except on a very small shoot there is no difficulty in distinguishing the two species.

The Coast Mistletoe, true *Ph. celastroides*, is only definitely found in Victoria in the East. I know of no locality west of the Gippsland Lakes. I have looked carefully at many *Banksias* from Black Rock to Rosebud, and have found none of it there. The specimens shown to me at the Herbarium were also all eastern, but there is a long interval not searched.

Frankston is mentioned in Professor Ewart's *Flora* with hosts given for this species, but this seems clearly due to my report of the Frankston excursion, 1917. This is quoted by Blakely in his revision of the genus, and has passed into Ewart's work. At that date I, like others, used the name in the old comprehensive sense. The occurrence is certainly *Ph. eucalyptifolius*, as are also others referred to in the same number of the *Naturalist*, July, 1917.

Nearly all old records as *Loranthus celastroides* in the *Naturalist* are *Ph. eucalyptifolius*. Dr. C. S. Sutton's specimen from Lakes Entrance is probably true *celastroides*. The late Mr. H. B. Williamson, with his wide knowledge of Victorian plants, told me he had not seen any like my specimens of *Ph. celastroides*. Mueller in an early report uses *L. eucalyptoides* DC. for both, but notices a difference in foliage when growing on *Banksias*. This is not, however merely due to the host plant.

The Common Mistletoe is recorded in the census from all five districts in Victoria, but I know of no definite record from typical north-western country. It is mentioned by D'Alton, but by the abridged article as published might not be far from the Grampians. Mr. A. D. Hardy has recorded it from Whrou, and I have a specimen from Mr. F. H. Salau from Tooborac, but

Zimmer does not find it near Mildura, and it is not recorded from South Australia. About Melbourne it occurs in all the three chief kinds of country: Beaumaris and Werribee, for example, as well as the forest-country.

This species may be overlooked in a full-foliaged Eucalypt. It seems, also, to be partially deciduous, foliage being often scanty and partly of a reddish colour in late winter, but this is possibly more pronounced in the exposure on deciduous trees, such as Oak, Pear, or Hawthorn.

Flowers of Common Mistletoe may be found from mid-December onwards, and fruits in autumn and winter. The Coast Mistletoe seems to flower a little later.

The remainder of our Loranthoid forms have so far been placed in the one genus *Loranthus*. There are now other generic names, but it will be sufficient merely to indicate these. They do not affect the recognition of the species.

We have two species of *Loranthus* with "terete" or wire-like foliage, both included under *L. linophyllus* by Bentham and Mueller, though at an early date Mueller used the name *L. Preissii*. *Loranthus (Amyema) Preissii*, Miq., Wire-leaf Mistletoe, has slender leaves, plant not hairy (except possibly a little on very young growth), general aspect green.

Loranthus (Amyema) linophyllus, Fenzl., Slender Mistletoe, is not so slender as the other, buds very hairy, general aspect of all my examples greyish. The vernacular name was chosen before *L. Preissii* was separated.

L. Preissii, Miq., Wire-leaf Mistletoe (in the Census, 1928, two lines are partially transposed). Of this I have excellent examples from Mr. Zimmer from the Mildura district, all growing on Acacias. My Creswick record as *L. linophyllus* in the *Naturalist*, June, 1915, is *L. Preissii*, which also occurs on the Bullarook Creek near Smeaton. *L. Preissii* seems also indicated by a specimen sent to D. Macdonald from Derrinallun (Dodder-like with pink fruit). It is definitely at Torquay and Sorrento on *Acacia rhetinodes*. (A record printed as Toronto may mean Sorrento). Zimmer mentions that it also grows on Tree Lucerne.

For true *L. linophyllus*, Fenzl., Slender Mistletoe, all the definite records I have for Victoria are north-western. Again, there are fine specimens from Mr. Zimmer, which grew on *Casuarina leptophylla* and *C. Luehmannii*; it was especially plentiful at Kulkyn, less so at a locality west of Mildura, and not seen at the border; it is not recorded from South Australia. I have also received it from near Raiphew, and the Herbarium has good examples from Mr. F. M. Reader, Murra Warra, and Wallup, east of Dimboola. The name on labels, *L. linophyllus*, var. *eriantha*, F. M. Reader, indicates a distinction from the better-known *L. Preissii*, then called *L. linophyllus*. This is, no doubt, the "reed-

like" *Loranthus*, noted by Waterhouse and Lyell near Dinbough. I have a specimen also from near Echuca (F. H. Salau). A specimen at the National Herbarium from "towards the junction of the Murray and Ovens" seems uncertain. Further examples from this district would be desirable. Old specimens of both these species seem to be very brittle, and fresh examples from all the localities would very likely be acceptable at the Herbarium. I have not located the occurrence of Dr. Sutton's on the basalt plains; it may be either of these species, but *L. Preissii* seems more likely.

In reference to species with flat leaves, the name *Loranthus pendulus*, Sieb., is very familiar, and the best known form east of Melbourne is true *pendulus*, but the old use of the name covered three species or more.

Loranthus (Amyema) miraculosus, Miq., has small flowers less than an inch long, the central flower of three sessile. The leaf is rounded at the end, and may reach three inches, but is often smaller. It is recorded from East Gippsland, and, in perhaps a different form, from the Mildura district by Mr. Zimmer. There it grows on *Eucalyptus* and *Myoporum*, as in South Australia.

The true *L. pendulus*, Sieb., Drooping Mistletoe, also has the central flower of three sessile. Several fruit or flower groups should be looked at, as the real central flower may fail. From the following species it is also readily distinguished by the rusty-coloured twigs, possibly a little less pronounced on some riverside wattles, but still distinct. The leaves are occasionally very long—sometimes more than a foot in length—but usually only a few inches. The only example noted by Mr. Zimmer near Mildura had very long leaves, and a very few with these long leaves have been noticed near Frankston and Bairnsdale.

The flower is usually a good red, very rarely yellow. The flowering season seems to be long or irregular. Flowers and nearly mature fruits are often seen together. This is a common species of the outer eastern suburbs, and near Frankston. It grows on many Eucalypts, Acacias, and others, rarely on Casuarinas. Many of its localities need re-observation, as they include the following species.

Loranthus (Amyema) Miquelii, Lehm., Long-leaf Mistletoe of the Census, Stalked Mistletoe of Ewart's *Flora*, is readily distinguished from *L. pendulus* by having all the flowers stalked. At a glance one may notice the brightness of the foliage and twigs, the latter often with a yellow or reddish tinge. An old plant frequently hangs down in a long, inverted cone to an extent rarely noticed in *L. pendulus*, and may show very straight, slender branchlets. The leaves are often longer than the ordinary *pendulus*, but not as long as the exceptional plants above noted. The

flowering season is mostly late summer—February, or later at Bairnsdale.

L. Miquelii has largely escaped notice about Melbourne, as it seems to be absent from the well-known south and east suburbs. It is abundant, however, in Box country at Eltham and near Yarra Glen, and occurs on Box at Melton. The information about this species is affected by the misplaced line in the *Census*, 1928. Hence the "except Gippsland" in Ewart's *Flora*, which should have belonged to *L. Preissii*. *L. Miquelii* is abundant at Bairnsdale on various Boxes, Red Ironbark, and *E. tereticornis*, but very rarely, if at all, on *Acacia* or *Casuarina*. Mr. Zimmer finds it in the Mildura district on various Mallees, as well as *E. Camaldulensis*, Dehn. (*rostrata*) and *E. bicolor*, A. Gunn. It is certainly present at Bendigo, and may very likely be found in all the five districts used in the *Census*. It has no doubt often been recorded as *pendulus*, and it would be well to re-observe all "*pendulus*" records in Box, Ironbark, or Mallee country. I did not observe it on Stringybarks, but it occurred near Bairnsdale on true *L. pendulus*, which was on a Stringybark (*E. eugenoides*).

L. Miquelii is the most widespread of our Mistletoes, occurring in all the mainland States of Australia. Bright twigs do not always indicate it, but serve to distinguish it from *L. pendulus*.

Ph. eucalyptifolius is often bright, but differs in the inflorescence, and other characters mentioned. Some others also may have shining twigs.

In our examples of the Grey Mistletoe, *Loranthus quandang*, Lindl., the foliage is greyish, often yellowish on young tips, with the flowers in threes on a two-rayed inflorescence, the central flower sessile, the others close to it. All the Victorian records of this species known to me are on *Acacias*. It was still present recently at the Dandenong Police Paddock on Blackwoods, and is abundant on riverside Wattles at Yarra Glen. The only locality I know in the East is Williamson's Tambo Valley record. The Grey Mistletoe is recorded in the north-east at Buffalo Creek. It is also known from the Grampians, but I know of no typical north-western locality. I have seen flowers in December, but it probably flowers at other times also.

In Victoria there is not much difficulty with this species, but in the other States considerable sorting was needed. It appears that the original type sheet contains two species, and a note of Mitchell's in his *Three Expeditions* mentions as this species a plant which seems to be different, with much brighter flowers. This note would be enough to explain why Mueller did not at first call the Victorian plant *L. quandang*, but named it *L. canus*. There appears to have been some confusion with *L. miraculosus*, which occurs on the Quandang.

The remaining species of *Loranthus* in Victoria belong to

groups in which the perianth segments are united to a considerable part of their length. Those already mentioned have the segments free.

The Harlequin Mistletoe, *Loranthus (Lysiana) exocarpi*, Behr., has the flowers solitary or in pairs, usually bright red with green tips, but sometimes yellow. In Victorian examples the leaves are usually narrow, strap-shaped, and up to about 4 inches long. It grows on many kinds of plants, and at Mildura attacks citrus trees. It is recorded by Dr. Sutton from Bulla, and I have seen it at Melton and Laverton. It is abundant at Station Peak. At this place it sometimes grows on *Bursaria*, a tree on which I have not seen any other Mistletoe even in places where *Ph. eucalyptifolius* or *L. pendulus* or *Miquelii* are common.

An article on the growth of this Mistletoe by Mr. C. C. Brittlebank is in the *Proceedings of the Linnean Society of New South Wales*, Vol. 33, 1908.

The Long-flowered Mistletoe, *Loranthus vitellinus*, F.v.M. (also called *Dendrophthoe curvata*) is found in Victoria only in the far east, and at Mallacoota it occurs quite frequently. As the trees are fairly tall, the Mistletoe can escape notice, and in the flowering season about January is often located by its fallen flowers. The flowers are large, bright coloured, carried in a more racemose arrangement than in most species. Leaves commonly rather large and broad. The species is said to make aerial roots as in our species of *Phrygilanthus*, but I had not much opportunity to observe this.

This species was merged by Bentham in the Indian *L. longiflorus*, though a related form was kept distinct. From the Common Mistletoe it is easily distinguished by its anthers and the united perianth segments.

The Viscoid Species.—Of these, two species are now known in Victoria, both of which have been dealt with by Mr. F. Robbins in a recent *Naturalist*.

The Golden Mistletoe, *Notathixos subaurens*, Oliver, occurs freely at Mallacoota, those that I saw being near the coast, but not in coastal scrub. The golden colour makes it conspicuous, usually at some height in the trees. All the examples seen were associated with other Mistletoes, *Ph. eucalyptifolius* and *L. vitellinus*, and some were definitely parasitic on these. In most cases the plants were out of reach, and too dense to examine with the glasses. This species is stated to be always parasitic on other Mistletoes.

In some cases it is mentioned as growing on other plants, but no definite statement made as to attachment. Probably another Mistletoe grows on the tree, and the *Notathixos* on it. The species occurs only in the far east in Victoria, but its range there

is not known. The name *N. incanus* has been used comprehensively to include this and others, but is now restricted.

Korthalsella articulata (Benth.) Blakely is quite different from all our others, leafless, with a flat jointed stem and minute flowers at a collar. It is difficult to detect on a *Eugenia*. The Gippsland occurrence on *Eugenia* in a moist valley agrees well with records from Moreton Bay, and the Clarence and Richmond Rivers, but the plant is also recorded from the north end of the Flinders Range, and even from Ooldea, where the conditions must be very different.

KEY TO VICTORIAN MISTLETOES.

After finding a name by a key, closer comparison should be made with descriptions.

- I. Flowers conspicuous. Anthers attached at the back to the point of the filament and freely movable.

PHRYGILANTHUS

Leaves short and broad, pedicels and bracts minutely pubescent,

PH. CELASTROIDES *concl.*

Leaves a few inches long, mostly not wide. Pedicels and bracts without hairs.

PH. EUCALYPTIFOLIUS

- II. Flowers conspicuous. Anthers attached firmly at their base.

LORANTHUS

- (a) Petals free, leaves terete.

Leaves thin, plant without hairs.

L. PREISSII

Leaves stouter, buds hairy and grey.

L. LINOPHYLLUS

- (b) Petals free, leaves flat.

Plant greyish, flowers rather small, grey outside; three flowers close together.

L. QUANDANG

Flowers small, under 1 inch, central flower of three sessile; leaves small.

L. MIRACULOSUS

Flowers of moderate size; central flower of three or more sessile.

P. PENDULUS

Flowers of moderate size; all flowers stalked; twigs bright.

L. MIQUELII

Occasionally others may seem to be all stalked, if a sessile flower has fallen, especially if there were originally 4 or 5 flowers.

- (c) Petals united to one-third of their length or more.
 Flowers solitary or in pairs. *L. EXOCARPI*
 Flowers several, each stalked on the axis of the inflorescence. *L. VITELLINUS*
- III. Flowers minute. Stems jointed, leafless. Flowers clustered at a collar. *KORTHALSELLA ARTICULATA*
- IV. Flowers minute. Plant leafy with a golden tomentum. Flower clusters stalked. *NOTOTHIXOS SUBAUREUS*

Additional Notes.—My examples of *L. vitellinus* from Malla-coota have the little calyx distinctly toothed, and the bud pointed. These are two differences from the Indian *L. longiflorus*. The central flower of *Ph. colastroides* in my examples is sessile. The flowers are sometimes small, but the anthers and leaves differ from *L. miraculosus*.

CORMORANT'S STRANGE "COLLAR"

When speaking to Mr. F. Rae, Director of the Botanic Gardens, a few days ago, he mentioned that one of the gardeners told him he had seen a Cormorant (Shag) with a red neck amongst other Cormorants at the lake. Mr. Rae immediately got his field glasses, went to the lake, crept up to within a few yards of the bird, and was surprised to see it had a piece of red rubber, about 5 or 6 inches long, around its neck, and that only a part of the beak was visible. The gardener informed Mr. Rae that a piece of rubber, either off a cricket bat or tennis racquet handle, was noticed by him on the lawn previously, so this was probably the same piece that was noticed around the bird's neck. The bird remained in the gardens for some days, and later was observed on the Yarra near Princes Bridge by Mr. F. Morris, of the National Herbarium. The question arises, "How did the bird get its head and neck through the rubber?"

C. FRENCH.

ADDITIONS TO LIBRARY

- On the Barrier Reef*, by S. Elliot Napier. Presented by Mrs. E. E. Freame.
The Vegetation of Chatham Island, by T. von Mueller. Presented by Mr. S. C. Richardson.
Atoms, Men and Stars, by Rogers D. Rusk.
The Mollusks of South Australia, by Bernard C. Cotton and Frank K. Godfrey.
The Shellfish of New Zealand, by A. W. Powell.

EXCURSION TO WOOD'S POINT

At the commencement of the Foundation Day week-end—mid-day on January 26, six members left Melbourne to proceed via Moe to Cooper's Creek, the first stop on a geological tour through the country centred about the old mining towns of Walhalla, Matlock, and Wood's Point.

The small hamlet of Cooper's Creek, situated at the junction of two mountain valleys, one occupied by a stream of the same name and the other by the Thomson River, was found to possess two features of geological import, namely, the works and quarry of the White Rock Lime Company and the abandoned workings of the old Copper Mine, both located on the valley slopes above the hamlet, the latter at an elevation of 780 feet above sea level, and about 300 feet above the Thomson. Concerning the former, it may be said that, although a search for fossils in the Silurian limestones at the quarry yielded only occasional stromatopora, the palaeontologists were rewarded by a surprise discovery of trilobite fragments in the mud-stone blocks of an unsurfaced road leading into it. The Copper Mine, which may be seen from the quarry, is on the opposite side of the Thomson and, since 1865, has been worked by several companies for the recovery of gold, silver, and platinum, in addition to copper. The origin of the ore is linked with the Upper Devonian igneous activity, which gave rise to a swarm of parallel dykes—mainly dioritic, but ranging from acid to ultra-basic types—traversing the Wood's Point-Walhalla goldfield. Mining was practically confined to one of these dykes which, in its lower levels, was a probably propylitized peridotite rich in disseminated chalcopyrite, though much of the ore was taken from the neighbourhood of the outcrop where weathering had influenced the enrichment of its more valuable constituents. Little time was spent in the locality as much of the day had been consumed in the journey from Melbourne, and the party had still another five or six miles to cover before reaching Walhalla. This latter portion of the journey being along the remarkable Stringer's Creek gorge on a narrow rock-hewn road showing some fine sections of folded, contorted, and faulted Silurian shales and sandstones. At Walhalla, though the elevation had increased to 1,210 feet, it was noticed that this most interesting old town was still confined within a deep valley, and that many of the now disused houses, due to the principle of building into excavations in the valley slopes, appeared as serried appendages of the roof of the house below, and the floor of that above.

Leaving Walhalla on Sunday, the narrow winding road to Aberfeldy was traversed under perfect weather conditions. The road throughout the major part of the journey, following a narrow ridge branching from the Main Divide with a southerly trend past Mt. Singleton, through Mt. Lookout, toward the confluence of the Thomson and Aberfeldy Rivers, each deeply entrenched in extensive valleys which closely skirt opposite sides of the ridge. In several places outliers of older basalt cap the ridge, and have been claimed by Professor Gregory (1) to be remnants of a lava flow which filled the now fossil equivalent of the existing Thomson drainage system, and, interestingly enough, Reginald Murray (2) mentions a possible continuation of the same system in an old river bed buried under 200 feet of Older Basalt, commencing in line with the southern termination of the ridge, and extending southward toward Toongabbie. Hence it would appear that, subsequent to the obliteration of the early drainage system by the lavas, the Thomson and Aberfeldy have been developed as twin streams commencing to excavate their present valleys on either side of the resistant basalt flow, and, with continued denudation, leaving the old valley perched nearly two thousand feet above the new. As it followed this ridge which was once a valley, in places barely truncating its almost knife-edged summit, the road afforded an occasional glimpse of the Bay of Plenty plateau.

On ascending to the 3,600 foot level of Mt. Lookout, a search for olivine in its Older Basalt capping yielded only decomposed specimens, though crystals of a white mineral lining vesicles was found, but has not yet been identified. Other vesicles were found to be infilled with chalcedony, and anorthoclase feldspar, in small rhomb-shaped crystals and pieces up to two inches in length, was also found in the rock itself. This latter mineral, like that which occurs in the newer and older basaltic lavas and ejectamenta of Mt. Franklin, the Anakies, and in the basaltic dykes of Flinders, is probably of intratelluric origin. And, since much of the material on Mt. Lookout consists of compacted agglomerate, the site of the mountain evidently approximates to one of the Middle Tertiary points of eruption instrumental in the dislocation of the old drainage system of the immediate area.

After leaving Mt. Lookout the party proceeded to Matlock, a former mining town, which, during its period of importance, was claimed to own the highest town location in the State. According to Richard Mackay (3) it came into prominence in the year 1862, and some years after the town, built upon the 4,140 foot summit of Matlock Hill, was destroyed by fire and subsequently rebuilt on a new site lower by 140 feet. Like many similar towns, Matlock in its prime was possessed of an almost legendary collection of hotels. Now a fewer number of prosaic dwellings struggle to rescue it from total oblivion. In the afternoon a four-mile descent to 2,230 feet saw the party at Wood's Point, where the surface workings and dump of the Morning Star Mine were inspected, the dump yielding specimens of diorite, from one of the swarm of dykes which characterize the Wood's Point field, together with crystals of quartz, pyrite, arsenopyrite, and ankerite.

From the summit, the nearness of the 4,543 foot bulk of Mt. Matlock (Kelly's Hill) and the Divide foreshortened the view to the west, but the remaining visual arc was sufficient to include Mrs. Raw Baw, Lookout, Useful, Wellington, Howitt, and Skene. And, in itself splendid, the mountain-strewn panorama was greatly enhanced by the mist-filled valleys of many of the streams heading near the Divide, that of the Thomson River appearing as a series of mountain peaks rising above a huge glacier extending as far as the eye could penetrate to the south-east.

Monday was spent in a leisurely and most reluctant return along the Yarra Track to McVeigh's, thence via Warburton to Melbourne. Many of the roadside quarries in the Silurian rocks of the Yarra Track were prospected for fossils under the guidance of Mr. W. S. Abraham, of the Geological Survey who, having spent a number of years in the area at a time when mining was paramount, apart from being in possession of an intimate knowledge of the country and its former inhabitants, also served as guide to the location of the quarries and their contents. Suffice to say, a splendid collection of graptolites was made, one quarry yielding some fine specimens of one of the most ancient of the vascular land plants, belonging to the genus *Baragwanathia*, these terrestrial fossils being in most cases broken from stone rich in a single species of *Monograptus* of purely marine origin.

A. FROSTICK
S. R. MITCHELL.

References:

1. Gregory, J. W., *The Geography of Victoria*, 2nd Edn., Whitcombe & Tombs, Melbourne, 1912, p. 117.
2. Murray, R. A. F., *Geology and Physical Geography, Victoria*, 1st Edn. Mines Department, Melbourne, 1887, p. 111.
3. Mackay, R., *Recollections of Early Gippsland Goldfields*, Traralgon, 1916, p. 11.

THE LATE MR. WALTER CHAMPION HACKETT

One of the best known country members of the Field Naturalists' Club, Mr. W. Champion Hackett, passed away at a private hospital in Adelaide last month, at the age of 74 years.

Mr. Hackett entered his father's business as a nurseryman and seed merchant in 1880, and remained in it for over 40 years. When the business was made a proprietary firm he became the foundation director, retiring some years later.

Mr. Hackett had a very extensive and broad knowledge of plant life. He was secretary of the South Australian Horticultural and Floricultural Society for 35 years. He was a welcome judge at Agricultural and Horticultural Shows in the eastern States for many years. He was a member of the South Australian Royal Society and the Field Naturalists' section, having been Chairman of both. He was President of the Australian Society of Nurserymen and Seedsmen, and a member of the South Australian Fauna and Flora Protection Committee.

Mr. Hackett was also a member of many similar societies, and his assistance and advice was much sought after by the members.

Mr. Hackett was a frequent visitor to Victoria, and he always tried to arrange his visits here so that they would synchronize with either the meetings of the Club or with the Wild Nature Show.

Mr. Hackett's greatest interest, perhaps, was in his library. He was a keen collector of books, especially those of Australian literature. His library was a famous one, numbering many thousands. Kindly, genial and courteous, Mr. Hackett was always a welcome visitor, and he will be greatly missed by his friends and acquaintances.

J. E. Prescott.

THE LATE MR. JOHN F. BAILEY.

The botanical and horticultural world of Australia has lost a good friend and a capable worker in the passing of Mr. J. F. Bailey, of Brisbane. Mr. Bailey's grandfather landed in Adelaide in March, 1838, and, having brought with him some valuable plants the Governor appointed him as Government Botanist with a commission to form a Botanic Garden. Here the famous Frederick Manson Bailey, later Government Botanist of Queensland, was trained by his father. For 35 years he held that position in Queensland, being succeeded on his death by his son John F. Bailey. Mr. J. F. Bailey held the position of Government Botanist of Queensland and Director of the Brisbane Botanic Gardens. From there he transferred to a similar position in Adelaide, retiring therefrom about three years ago. The late Mr. Bailey's nephew, Mr. C. T. White, is Government Botanist of Queensland, and his son, Mr. F. M. Bailey, B.Sc., is on the staff of the Commonwealth Forestry Department.

Mr. Bailey possessed a very happy and friendly nature, and he made friends wherever he went. Although not a member of the Field Naturalists' Club, he was very well known to many of the members, who feel his loss in many ways. Mr. Bailey will be greatly missed, and long remembered.

E. E. Prescott

The death is announced, as the result of an accident of Mrs. Mary Barnard, widow of the late Mr. E. G. A. Barnard, who was an original member of the Field Naturalists' Club, and who was so well known for over 40 years as Editor of the *Victorian Naturalist*. Mrs. Barnard's father, Mr. H. Watts, was also an original member, and the first librarian to the Club. Mr. Watts specialized in the study of seaweeds, and was an acceptable lecturer on those marine plants. Sympathy is extended to the family of our late friend, who was so well known to the older members.

R.E.P.

EXCURSION TO TORQUAY.

Arriving at differing periods on Saturday, June 11, eight members attended the excursion held during the King's Birthday week-end. Those members present in the afternoon, gaining the beach where the almost unbroken line of cliffs to the south-west of Torquay were breached by the Spring Creek, made a rather hurried collection of minerals occurring near Bird Rock. A very cursory examination of the cliff on the southern side of the Creek was sufficient to indicate that it was fashioned from a rather ragged limestone containing a number of fossil echinoids, the forms commonly seen being *Lovenia forbesi* and *Echinocypris* (*Scutellina*) *patella*. Near the mouth of the Jan Juc Creek these limestones, here composed largely of tangled branches of the bryozoan *Cellepora gambierensis*, were seen to gradually rise toward Bird Rock. Near the latter, some interesting mineral specimens were collected from the sands and clays underlying these upper, bryozoal limestones. Gypsum was found to occur in veins, commonly of the clear transparent type known as Selenite, together with a crudely fibrous form approaching Satin Spar and a few bladed crystals; intricately traversing masses of clay fallen from the cliff. While the upper surface and joint faces of hard calcareous sandstone blocks, broken from a bed about 3 feet in thickness underlying the gypseous clays, yielded nicely banded specimens of ferro-calcite, or so-called "Mexican Agate." Unfortunately Marcasite, the third mineral to be obtained from these rocks, occurs in a bed of blue clay only at times uncovered at low tide, and on this occasion the site, where grouped Marcasite crystals should have been visible, was covered by several feet of shore sand.

The abundant fossil fauna of the marine sediments of the Torquay cliffs has been used by Messrs. Hall and Pritchard to typify an important stratigraphical horizon in the Tertiary geology of the State; associated with the Parish of Jan Juc and hence termed Janjukian. However, the presence of deep water off Bird Rock prevented an examination of the richly fossiliferous clays in the lower portion of the dome rising toward the Fishermen's Steps. But even in the restricted exposures available near Bird Rock a number of the common fossils, including *Spondylus gaederopoides*, *Cucullaea coriaria*, *Antigona dimorphophylla*, and *Glycymeris ornithopetra*; together with several species of *Turritello* and *Limopsis*, paired valves of *Venericardia*, and numerous specimens of the solitary corals *Flabellum* and *Bathyaëtia* were noticed.

The whole of Sunday was expended on an excursion to Point Addis, the rather long walk being interrupted at various points of geological interest. And, since the way to the Point was again to the south-west of Torquay and the going was easy, the early part of the journey more or less duplicated that of the previous afternoon. This time, however, the beach was reached via the Jan Juc Creek, and some attention paid to an aboriginal midden at the foot of the dunes on the northern bank of the creek. These dunes were littered with hollow branching sand tubes formed by the encrustation of roots, where the sand surrounding them had been cemented by limy matter derived by percolating meteoric waters from comminuted shell fragments contained in the sand. And although on the previous afternoon no Marcasite was discovered, small dusty crystals were on this occasion broken from septarian nodules in the hard bed below the upper clays of Bird Rock cliffs, and in the clays immediately underlying the hard bed. The presence of dark brown mineral grains in the sand of this part of the beach, more particularly near the mouth of the Jan Juc Creek, was also mentioned. It was formerly taken for granted that this mineral was Ilmenite derived from the basaltic lavas to the west, but an attempt by Mr. S. R. Mitchell to wash a sample on a previous occasion indicated that

it was of low specific gravity, subsequent tests proving it to be glazed limonite.

Since it was impossible to round Bird Rock the cliff was scaled, and after a short walk along the brink toward Fishermen's Steps, a concrete block marking the site of an old oil bore was noticed, and the oil project briefly commented upon. The way then led over broken hummocky country clothed by vegetation dwarfed by salt-laden winds from the east, with no item of interest other than the rather unusual glimpse of a wallaby negotiating the broken crown of a huge landslip near the so-called "Ochre Mine." On reaching this latter objective, the party had lunch near the ruined workings, and later descended to the beach along a cutting in the cliff once occupied by an inclined railway. Here, most of the material in the cliff is dark brown in colour due to impregnated bitumen, most likely derived as the residue of an oil seepage with evaporation of the volatile fractions. Irregular nodules of Jarosite, a yellow basic sulphate of iron containing a percentage of potash, were noticed in the cliff and along the beach. This mineral being responsible for the establishment of the "Ochre Mine"—doubtless so called because the "ochre" was manufactured and the "mining" consisted of collecting nodules mainly from the beach—where it was calcined, the potash recovered, and the iron content converted into ochre.

After leaving the "mine" and surmounting an elevated headland, a rather precarious descent was made by climbing down one of a series of deep gullies cut in a depressed area between the last elevation and the high land to the west of Point Addis. And after traversing a wide curving beach and again scaling the cliffs reached by wading through an ocean-bound arch at the end of it, a short walk brought the party within easy reach of Point Addis.

When tired of the impressive and ever restless activity of the ocean pounding at the resistant reefs, buttressing his lofty pedestal, the observer on Point Addis may command an almost limitless view of the coast to the north and south. On one hand the Black Rocks, the tiny houses of Anglesea, Point Roadnight, Split Point and the Lighthouse at Arrey's Inlet appear in succession to the south where, across the broad sweep of Loutit Bay, the Jurassic bulk of the Otways dwarfs Lorne. In the opposite direction the line of cliffs, along which several rather weary naturalists had yet to return, could be traced. And the several landslips, some almost a quarter of a mile in length, could be noticed in the foreground, the visual limit including Barwon Heads, where Mt. Colite finally merges in the mist.

From Point Addis the beach at the foot of a headland to the south was gained down a creek valley which had cut through limestones similar to those at Spring Creek. Common among the fossils collected at this point were the echinoids *Cassidulus australiac*, and *Arachnoides (Monostychia) australis*, while a small brachiopod, *Magedana compla*, was particularly abundant. Returning along the base of the cliffs as far as Rocky Point, as a result of a late start in the morning, the party steered a somewhat erratic course over the golf links on the outskirts of Torquay with the feeble assistance of a rising moon.

Since both of the members named as leaders of the excursion returned to Melbourne on Sunday evening, little can be said of the way in which the remainder of the party spent Monday, except that the cliffs in the neighbourhood of Bird Rock were visited for the third time in as many days.

H.T.C. and A.C.F.

The Victorian Naturalist

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, July 11, 1938. The Senior Vice-President, Mr. Geo. Coghill, presided, and about 100 members and friends attended.

Mr. Coghill apologized for the absence of the President, Mr. R. H. Croll, who had not yet returned from Central Australia.

BUSINESS FROM MINUTES

Re number of excursions per month, and the advisability of Sunday excursions. The assistant secretary reported that the committee had asked a selected sub-committee to draw up a suggested Sunday excursion programme, and after some questions, Mr. E. E. Pescott moved "That the committee's action be endorsed." Mr. P. Crosbie Morrison seconded the motion, which was carried.

LANTERN LECTURE

The subject for the evening was a lantern lecture on "Nature Notes and Queries," by Mr. P. Crosbie Morrison. Mr. Morrison dealt with various specimens and referred to many questions which he had read as the writer of nature notes in *The Argus*. Numerous lantern slides illustrated the talk, which was very interesting.

CORRESPONDENCE

Letter re "Percy St. John Testimonial Fund." This matter had come before the committee, who had decided to bring it to the notice of members at this meeting.

ELECTION OF MEMBER

On a show of hands, Mr. John Martin was duly elected as an ordinary member of the Club.

REPORTS OF EXCURSIONS

Excursions were reported on as follows: von Mueller Memorial, Mr. H. C. E. Stewart; Zoology School of Melbourne University, Mr. L. W. Cooper; National Museum lecture on "Fish," Mr. F. S. Colliver.

EXHIBITS

Mrs. M. E. Freame.—Living Sea-anemone from Altona.

Mr. T. S. Hart.—Specimens of all Victorian Mistletoes (excepting *Korthalsella*).

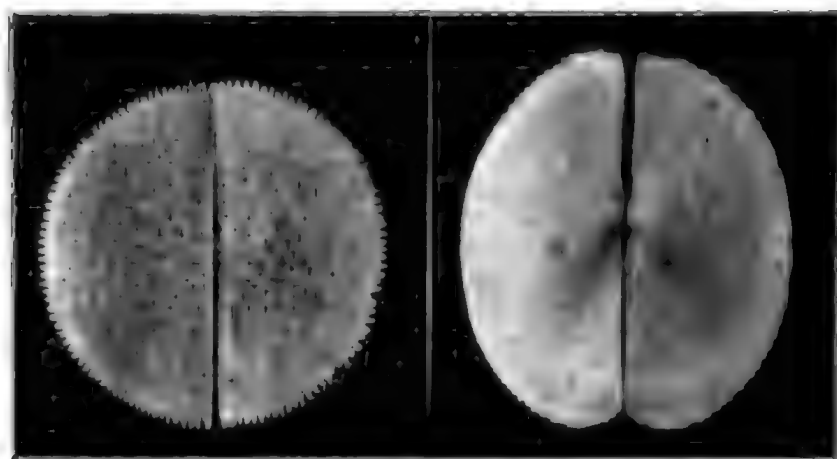
Mr. S. C. Richardson.—Volcanic bombs from Mt. Eden, Auckland, New Zealand.

Mr. F. S. Colliver.—Polished specimen of "Landscape Marble."

EPHIPPODONTA—SOUTH AUSTRALIA'S MOST PECULIAR BIVALVE SHELL

By BERNARD C. COTTON
(*Conchologist, South Australian Museum*)

In 1886, R. Tate recorded a South Australian bivalve which was found by J. G. McDougall "creeping on rocks at extreme low tide, at Edithburg, Gulf of St. Vincent." The shell was described as "minute, approximately semicircular in outline, subequilateral, compressed, yellowish white." Tate provisionally named the species *Scintilla* (?) *lunata*, in allusion to its moon-like shape.



Ehippodonta McDougalli Tate (left).
Ehippodonta lunata Tate (right).

Further specimens of this and another new species having the "Surface of the valves with numerous compressed slender ridges radiating from the umbo . . . all bearing papillary scales" were later forwarded to Tate by the same collector and the more correct habitat "on the mud-formed burrows of shrimp sheltering beneath large stones between tide-marks" was given.

Recognizing that no described genus was available for these remarkable shells, Tate, in 1888, introduced a new one, *Ehippodonta*, naming *lunata* as genotype and describing the second species as *Ehippodonta McDougalli*. The generic name was used "in allusion to the cardinal teeth riding, as it were, one on the other by their tips and not interlocking."

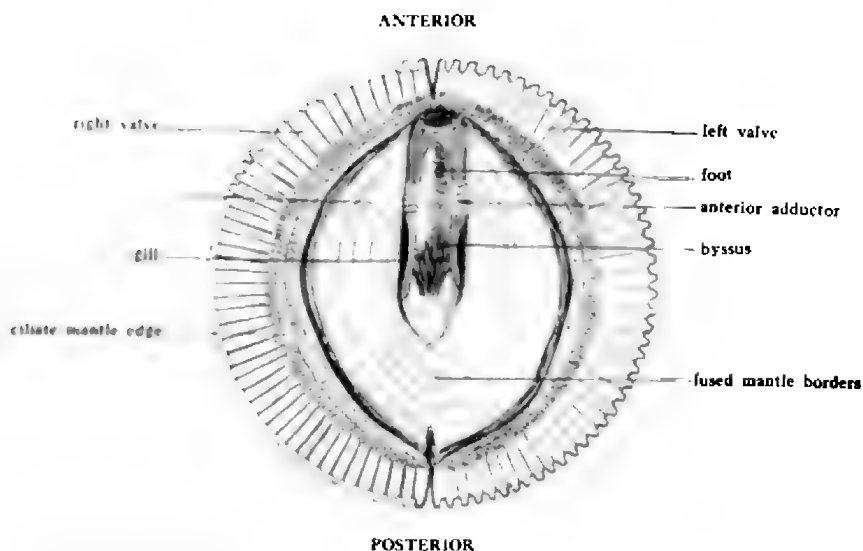
The shells are flexible in life, brittle when dry, and possess two bifid cardinal teeth in each valve, each pair touching the tips of the other and not alternating or locking. A cartilage is wedged between the teeth and is received in a shallow pit on the dorsal margin of each valve.



The burrow of the Slow Shrimp, *Axius plectorhynchus*,
with *Ephippodonta McDougalli* in situ.

The external papillose sculpture of the shell readily crumbles off and dried specimens of *lunata* have frequently only the smooth, faint, concentric acceremental striae left. The shell is spread out flatly when the animal moves and cannot be closed to a less angle than 70 degrees.

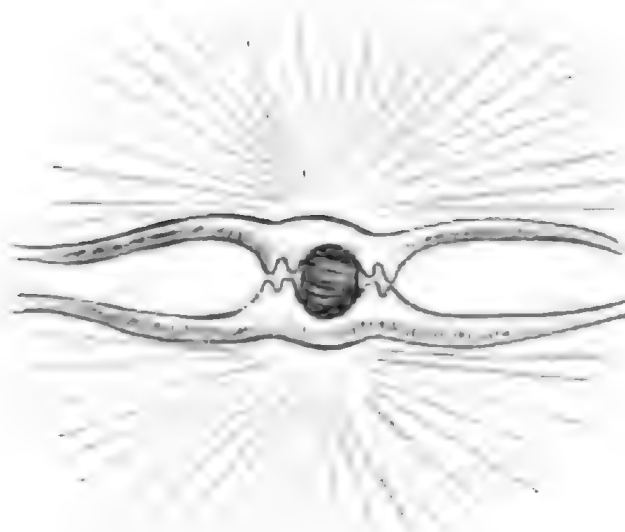
Both species are yellowish in colour, but a specimen of each taken in rock crevices at Reevesby Island are deep pink and a little more coarsely sculptured. An examination of some two hundred specimens of each species deposited in the South Australian



The ventral surface of the animal and shell.

Museum, from various localities, suggests that the Reevesby Island specimens are merely local variants.

By transmitted light the shell of *McDougalli* is seen to possess a lattice-work structure of radials and finer concentrics, leaving the interspaces thin and transparent and even wanting in decalcified sections, recalling the fine perforations of *Scintilla*, but in *lunata* the lattice-work is extremely fine, leaving microscopic transparent interspaces. A remarkable feature is the fact that the shell is really internal, for a thin layer of the mantle is reflected over the outer surface of the valves, completely covering them



The hinge of *Ehippodonta McDougalli* Tate.

and probably forming the hollow, club-shaped sensory papillae seen on the dorsal surface of *McDougalli* and the coarse grains seen on the dorsal surface of *lunata*.

The ventral surface of the animal is large, disc shaped, and a long tongue-shaped byssiferous foot protrudes from the anterior ventral opening.

At the posterior end of the body there is a small opening between the mantle folds, where there is a minute rudimentary siphon. The sexes are separate, but only the anatomy of the male *McDougalli* has been described by Woodward in the *Proc. Mal. Soc. Lond.*, vol. 1, pp. 20-26, pl. 1, 1895.

E. H. Matthews accompanied McDougall during December of 1890 to Edithburg and took both species at the original locality. Matthews later gave a description of the burrow in the *Conchologist*, 2, p. 144, 1893.

Specimens of both species have been taken alive either in the shrimp's burrow or in rock crevices at Outer Harbour, Marino,

Sellicks, Willunga, Edithburg, Coobowie, Corny Point, Port Lincoln, St. Francis Island.

The burrow of the Slow Shrimp, *Axiac plectorhynchus*, in which *Ephippodonta* lives, may be set at almost any angle, though it is usually horizontal and from one-half to one-and-a-half inches in diameter.

- On hard limestone reefs the burrow is built upon, between, or in the cracks of the rocks and is formed of tenacious mud. In soft calciferous sandstone the shrimp burrows into the rock and lines the cavity with tenacious brown mud consisting chiefly of excrementitious matter. An orange-coloured sponge, too, lines the burrow.

The *Ephippodonta* forms a slight depression in the sponge or mud lining and squats down in it so as to avoid obstruction to the movements of the shrimp. From March to July the burrows are filled with minced sea-weeds, evidently to provide food during the stormy part of the year when it would be difficult to venture out for supplies. Under the minced weed large numbers of juvenile *Ephippodonta* line the burrows.

The burrow of the Slow Shrimp seems particularly attractive to certain small incubatory, commensal, nestling bivalves, for in it are found occasionally *Mytilus deshayesi*, *tasmanicus* and *gemmatus*; *Kelha angasiensis* and *australis*; *Marikellia vincentensis* and *yorkensis*; *Lepton trigonale*, *ovatum* and *australe*.

EXCURSION TO SHERBOOKE FOREST

Twenty-six members with friends journeyed on Saturday, July 23, to the Sherbrooke Forest, which though familiar to most of our members never fails in its diverse nature appeal. Apart from a slight shower of rain during lunch, which was taken in the shelter of the pine plantation, the weather was fine, and the comparative dryness of the autumn and winter made conditions easy for traversing the forest floor.

The chief attraction of the excursion was, of course, the Lyrebird. At first it was difficult to sight *Menura*, though abundant evidences of mounds and scratchings attested to his proximity. In the afternoon the party separated into sections, and this resulted in locating several birds, one pair, a male and female, escorted by a friendly Pilot-bird, were quietly observed and followed for some distance near the Sherbrooke Falls. Later those who retraced their steps to the fire-break that fringes the forest near Sherbrooke Lodge were rewarded by sounds in the distance from two male birds close to each other. Possibly disturbed at our approach one of the songsters sought the sheltered silence of the undergrowth, but the other, a splendidly plumaged bird, obligingly leapt into view on a fallen log and voiced a superb outpouring of mimicry, agreed by those hardened devotees present to be the finest heard for brilliance and range of repertoire.

The botanically inclined in the party spent some time and attention in the examination of the rich native flora of the reserve, the ferns exciting special interest. A large number of species of fungi were noted, and an attractive mycological subject discovered was a vertical decayed log covered for about six feet with the "Rainbow Fungus" (*Polystichus versicolor*). The Wallaby seen on a previous visit was again sighted and appears to thrive in his delightful forest retreat.

A.G.H. and H.S.

NECTAR-SECRETING ORGANS IN ORCHIDS AND OTHER FLOWERS

Pollination of *Angraecum sesquipedale*

By EDITH COLEMAN

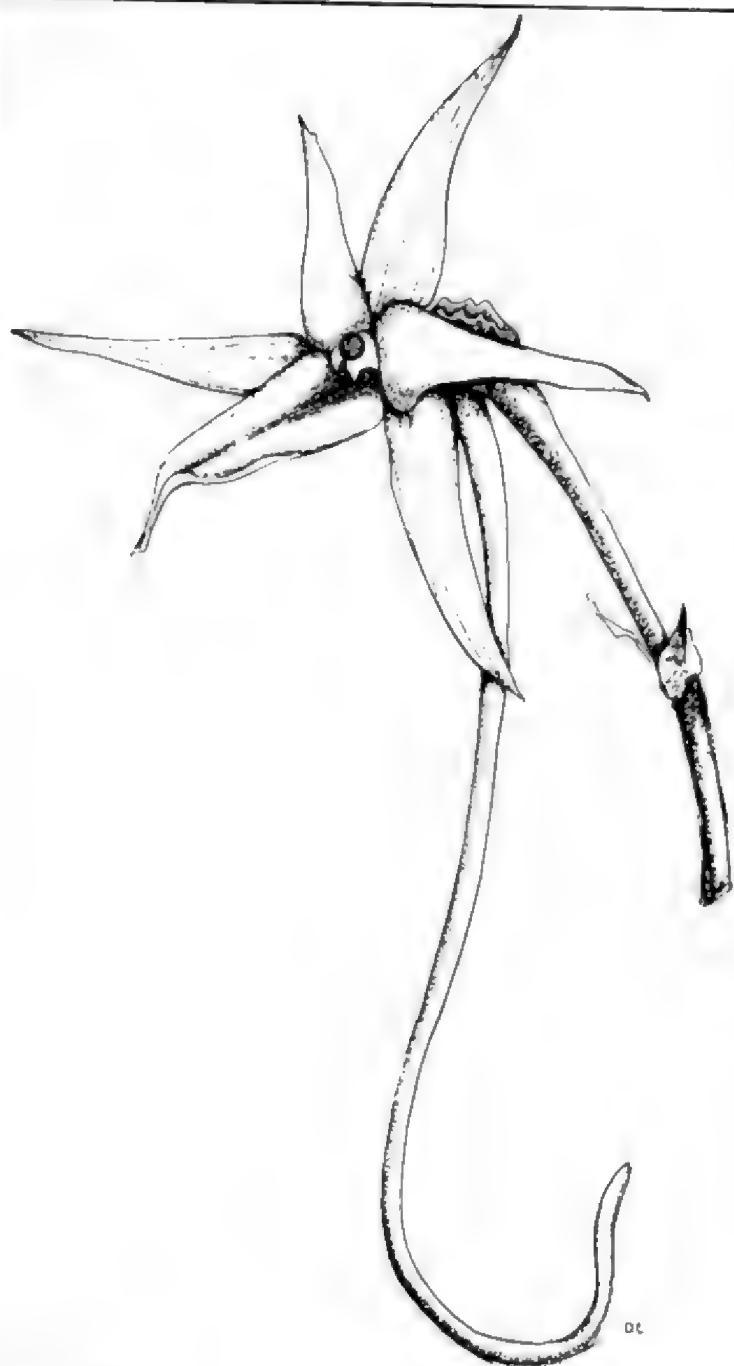
Previous articles in the *Victorian Naturalist* have shown conclusively that pollination is something more than a haphazard visit of bee to flower. It means more than transference of pollen from anther to stigma. It involves countless adaptations which facilitate that transference. The opening, closing and even the fading of flowers, the production of alluring odours and colours, of specialized pollen and specialized methods of attaching pollen, by dusting, sticking, or clipping, to the bodies of visiting insects and other carriers. Most important of all, it involves the co-ordination of insect and flower.

Pollination, then, is something which covers a thousand small processes, each of which is carried out with mechanical exactitude. The visit of an insect is a mere incident—the touch which turns the key and sets the mechanism in motion. And every one of these contrivances has been evolved in overcoming the tremendous handicap of plants in being rooted to earth, when it came to perpetuating their species. There were stems to be lifted high enough to make conspicuous the flowers they carried, and to facilitate diffusion into the air of insect-luring odours. There was nectar to produce, as well as pitchers and jars to hold it. Those nectar-jars are a study in themselves, if only for their great diversity, and their wonderful adaptation to the habits and appetites of the insects they lure. We find them in all shapes and sizes, from the midget pockets of Buttercups and Willows, tiny nectar-tails on the stamens of Pansies and Violets, shallow cups of Eucalypts, squat pouches of Poinsettias, to the more highly specialized nectar-spurs of Larkspurs, Columbines and Honeysuckles. And always the shape and size of the nectar-cups bear some relation to the insects and birds which visit them.

We frequently find nectaries on other parts of plants, as on the leaves of Cherries, the phyllodia of Wattles, or the stipules of Broad-beans; but the function of these glands is only remotely related to pollen transference. Some of them are mere scent pockets, others serve to hinder insects that are not useful as pollen carriers.

The leaves of some plants exude a sweet fluid in hot weather ("honey-dew"), and we have "manna," a saccharine exudation from leaves and stems of certain Eucalypts (not to be confused with Lerp manna which is excreted by insects).

In *Yucca* and other plants a sweet sap exudes from the peduncles, after flowers have fallen (*Vic. Nat.*, Sept., 1937, p. 77) and on the



A single flower of *Angraecum sesquipedale* cut from a two-flowered stem.

perianth of these flowers we may note, in early morning, clear tasteless beads of "nectar" which are palatable to flies and even bees. More moisture has been absorbed during the night than the plant could assimilate. We see this guttated moisture to perfection on the tips of the leaves of wheat and other seedlings.

All of these secretions, although they may serve as food and drink for insects, can only very indirectly serve the purpose of pollination. For this, the glands must be produced within, or just without, the flowers. Nectar may be secreted by individual glands, as in the Common Barberry, in which there are two glands at the base of each petal. More rarely the sepals produce the gland, as in the Lime, where the five sepals have been transformed into little boats with a gland in the centre of each. Sometimes the glands occur on the stamens, as in Violets and Pansies.

In regular, open flowers, like those of the Parsnip, nectar is usually secreted by a fleshy disc, or a fleshy rim, at the top of the ovary, and in this position it is accessible from all points of the compass.

Irregular flowers such as Larkspurs, are usually so situated that they can be explored from only one direction, in consequence of which a petal has been transformed into an alighting platform. In these flowers, the nectar is concealed in pits, or spurs, and must be searched for by a discriminating tongue.

And this brings me to the most specialized of all irregular flowers, the Orchids, in which both platform and concealed nectary have reached a high state of development. It must be remembered that Orchids do not secrete nectar in the ordinary meaning of the word. It would be as well to decide at this point just what may be regarded as nectar.

If we accept the word as applied by Greek poets to the beverage of the gods we must bear in mind that what may be ambrosia for bees may be neither sweet nor palatable to human beings. It is usual to regard as nectar any fluid sipped by insects when it is produced in proximity to the flowers. In general, the moisture content of authentic nectar is only about four times greater than that of the elaborated product of the bee's crop, but in many flowers it is almost pure water and can serve only as drink for insects. It is only recently that the use of nectar has been fully understood. Less than 150 years ago, opinion was divided as to whether it was useful or harmful to the plant. Because it was so often produced just above the ovary, some botanists believed that it served to protect the seeds. They called bees "robbers," and dealt with them accordingly. Others regarded bees as useful in removing a harmful secretion. Darwin (*Effects of Cross and Self Fertilization in the Vegetable Kingdom*) takes a somewhat similar view in expressing his belief that nectar was originally an excre-

tion of superfluous matter. He regarded it as perfectly in accord with natural selection that matter excreted to free a plant from superfluous, or even injurious, substances, should be utilized for highly useful purposes.

It was one of Darwin's stumbling blocks that, in certain Orchids which possessed spurs so obviously suitable for holding fluid, he could find no trace of free nectar, although he had seen insects with their proboscides inserted in these nectaries. It was only after



Petunia Hawk-moth with proboscis coiled.

many experiments that he discovered the fact that there were two walls to these apparently dry spurs—a tough outer skin, and a delicate, easily-penetrated, inner membrane. By cutting and pressing the spurs he obtained fluid from intercellular spaces between the walls. (That insects are attracted to “dry” nectaries seems to me one more proof that the sense of smell is highly developed in hymenoptera, and that bees respond less to colour than to perfume.)

Darwin found, as we in Australia are finding, that many apparently nectar-less Orchids yield copious fluid under pressure. Where there is no spur, or other nectar-pit, this fluid is usually secreted by a fleshy labellum, which is often studded with glands, or furnished with glandular basal lobes opening into the throat of the flower. In almost all Orchids, whose spurs do not contain free nectar, intercellular fluid is found.

And this brings me to what is perhaps the most remarkable nectar organ in the Orchidaceae, that of the creamy-white Orchid of Madagascar, *Angraecum sesquipedale*, whose spur ranges from ten to eighteen inches in length. Its pale colour and the long nectary proclaim it a moth flower. The spur contains free nectar to a depth of only an inch or so. What does that imply? Why, that there exists a moth with proboscis long enough to reach the deeply hidden nectar. Moreover, only by extending its tongue almost to the bottom of the spur can that moth remove the pollinia. To Darwin's delight a Brazilian moth was discovered whose proboscis was eleven inches in length. Wallace (1907) records a longer one. Since that date, specimens of *Angraecum* with even longer nectaries, and moths with co-ordinating probosces have been recorded, suggesting that nectary and proboscis have evolved side by side through mutual interdependence.

As in other such exclusive associations, pollination takes place infrequently, only sufficient fertile capsules being formed to safeguard the plant from extinction should vegetative reproduction fail.

CULTIVATED *Angraecums*

Through the kindness of Dr. R. S. Rogers, and the Curator of the Adelaide Botanic Gardens, I have been able to study living specimens of *A. sesquipedale* for two seasons in succession.

To my surprise, in addition to the fluid within the spur, I found copious, slightly sweet, secretion at the base of the labellum, which flowed round the upper part of the ovary. It was obviously not stigmatic. Glands on the inner wall of the spur secrete the free nectar at the bottom. I assumed that this upper flow was secreted by the glandular lobes of the labellum, probably a vestige of its aboriginal structure, when the *Angraecum* was a regular flower, with a nectar-secreting ring at the top of the ovary.

It is significant that the glands are on the labellum—a modified petal.

This fluid may serve as a sop for ants and other wingless creatures, that might otherwise steal the free nectar without pollinating the flower, or block up the spur. It may, of course, have been due to the moist atmosphere of the glass-house. (In a wild state the *Angraecum* grows in the hottest districts, attached to the driest parts of tree trunks, on the edges of open forest country.)

A similar secretion occurs in one of my favourite Irises (*I. ochroleuca*), in which, in addition to nectar within small pits at the top of the ovary, beads of sweet fluid are secreted on the wall of the ovary—to the delight of innumerable ants. For its pollination the Iris needs winged visitors, entering from above. The ants, which might otherwise rob the nectar-pits without touch-

ing the pollen, appear to be satisfied with the beads of nectar, and do not go farther. As any *Irises* which fortuitously produced moisture on the ovary wall would have been more successful in reserving their pollen for legitimate carriers that would pollinate



Petunia Hawk-moth with proboscis uncoiled.

the flowers, the adaptation was, doubtless, further developed along evolutionary lines. Darwin noted that the columns of some Orchids (*Acropera* and *Gongora*) secreted nectar after the flowers were pollinated, when it could be of no service to the plant. I have noted such secretion in cultivated Orchids (*Cattleya* and *Cymbidium*) after a lengthy period of anthesis. In these instances the flowers were not pollinated. I assumed that the secretion was of stigmatic origin. We see the same thing in Lilies, where a non-

saccharine secretion drips freely from the stigmata of unpollinated flowers.

In cultivation the spurs of *A. sesquipedale* often become undulant and twisted. Those of the Adelaide flowers varied in length from eleven to fourteen inches. The long, green spur is produced from the base of the labellum. The broad, notched rostellum arches over the opening to the spur. There are two viscid discs, one on each side of the notch, on the inner margins of the rostellum. Each disc bears a heavy, shortly stalked pollen mass. The stigma, like a little door-step, projects directly below the rostellum. I passed a dissecting-needle through the opening, even through the rostellar notch, without rupturing the membranes and freeing the pollinia. A thick knitting needle, however, as it entered the spur, depressed the rostellum. When withdrawn, the margins of the rostellum were lifted up, their inner surfaces adhering to the needle, bringing the pollinia with them. A pencil acted in the same way. It was thus clear that moths with thin, short proboscides could penetrate the spur, but these could neither reach the nectar nor depress the rostellum. To perform these functions the proboscis must be almost as long as the spur, and thick enough at the base to press against the margins of the rostellum. The specific name, *sesquipedale* (a foot and a half) refers to the measurement of the flower from base of spur to apex of dorsal sepal. In two of my dried specimens, the spurs alone measure $13\frac{1}{2}$ and $14\frac{1}{2}$ inches, the dorsal sepals being 3 inches and $2\frac{1}{2}$ inches long.

How fascinating it would be to see the moths at these long nectaries. It is delightful, in the garden at dusk, to watch swift Hawk-moths pollinating the Petunias. They never alight, but uncoil and insert the proboscis while hovering above the flowers. The proboscis of Darwin's moth, when not in use, was coiled into a spiral of twenty windings. Compare this with that of the Petunia moth (shown on page 65) in which there are only five windings.

Proboscis and spur emphasize the danger of over-specialization. A sudden failure of either moth or *Angraecum* would undoubtedly mean the extinction of the other.

I am greatly indebted to Mr. H. J. Solomon, Darling Point, Sydney, for further specimens of *Angraecum sesquipedale*, in one of which the spur contained $3\frac{1}{2}$ inches of nectar.

For the information of those who venture into the wilder parts of the State, a very helpful leaflet, reprinted from the Melbourne *Herald*, has been issued by the Federation of Walking Clubs, and will be available to our members. In it walkers are warned as to the precautions which should be taken, both before starting and while on the way. The proper equipment and food to be carried is suggested, and valuable advice as to camping is given. The leaflet is well worth digesting by all whose study of Nature requires the desertion of the beaten track in out-of-the-way places.

VISIT TO BARON VON MUELLER MEMORIAL

Despite the bleak wintry weather prevailing on the afternoon of Saturday, July 2, there was a good attendance at the commemorative visit arranged by the Club to the memorial of Baron Sir Ferdinand von Mueller in the St. Kilda Cemetery. In the absence of Mr. R. H. Croll in Central Australia, Mr. Geo. F. Coghill presided over the assemblage, which included representatives from various societies who wished to pay homage to the memory of the distinguished botanist. Many members of the Melbourne Deutscher Verein were present, and a handsome laurel emblem tied with national colours and suitably inscribed was placed on the memorial by Mr. M. J. Fabarius, their president. On behalf of our own Club a wreath of garden-grown native flowers, including *Epocris impressa*, *Acacia podalyriacifolia*, *A. rhetinoides*, *Thryptomene Mitchelliana*, *Grevillea rasmarinifolia*, *Plectranthus parviflorus* (foliage), dried specimens of *Banksia collina*, *Xanthorrhoea minor*, and *Gahnia psittacorum*, was also laid on the memorial. Sprays of similar native flora were given to all those at the pilgrimage.

As the planting of selected Australian shrubs at the base of the memorial proceeded, short addresses on the life, work, and character of the Baron were given by Mr. F. J. Rae (Director of Botanic Gardens and National Herbarium), Mr. Chas. Daley (President Historical Society of Victoria), Mr. M. J. Fabarius (President of the German Club), Mr. Chas. French, Mrs. V. H. Miller (representing the women of F.N.C.V.), and others.

The list of plants set in position is as follows:

Genera and Species	Planted by
1. <i>Correa rubra</i>	Mr. Geo. F. Coghill (F.N.C.V.)
2. <i>Thryptomene Mitchelliana</i> .	Mr. Chas. Daley (Historical Society of Victoria)
3. <i>Chorizanthe cordatum</i> . . .	Mr. F. R. Dowse (for St. Kilda General Cemetery Trustees)
4. <i>Grevillea laurundulacea</i> . .	Mr. F. J. Rae (Botanic Gardens and National Herbarium)
5. <i>Baeckea virgata</i>	Mr. M. J. Fabarius (German Club)
6. <i>Acacia myrtifolia</i>	Mr. A. Schoebel (German Club)
7. <i>Lhotskya genetylloides</i> . .	Mr. Chas. French.
8. <i>Melolencia nesophila</i> . . .	Mrs. V. H. Miller
9. <i>Calytrix Sullivanii</i>	Mr. E. E. Prescott
10. <i>Eriostemon myoporoides</i> .	Mr. G. N. Hyatt
11. <i>Viola hederacea</i> (clumps) .	Donated and planted by Mr. I. Hammett

It is proposed by the Club to acquire a plot of ground adjoining the left of the memorial to plant with suitable species named after the Baron. Towards the cost the sum of £3/5/- was subscribed by various friends at the pilgrimage.

Thanks are due to the St. Kilda Cemetery Trustees (represented at the gathering by Mr. D. Kidd) for facilities to plant the shrubs, and to Mr. Dowse, the curator, for preparation of the soil and the painting of grave railing.

When the planting of the extension is completed and the plants mature, the resultant miniature Australian garden should form a worthy embellishment to the handsome memorial, and a very attractive botanical feature at future pilgrimages which are intended to be held from time to time.

THE INDIGENOUS GRASSES OF THE FAR
NORTH-WEST OF VICTORIA

By W. J. ZIMMER, DIP. FOR.

With the exception of occasional patches of *Cynodon Dactylon*, *Sporobolus virginicus* and *Chamaeraphis spinescens*, the grasses of this region occur in a more or less open formation; they do not provide the continuity of soil cover that obtains in the pasture lands of the south. Although edaphic climax associations occur to a limited extent—as, for example, in the case of the Cane Grass areas on low-lying ground, many species of the family Gramineae form plant communities which intermingle with the more conspicuous types of vegetation. Other grasses appear as scattered individuals, some of which are confined to the grey soils of the alluvial flood plain of the Murray, while a few species are restricted to the adjoining red-brown soils. Some species thrive on both situations. The accompanying diagram illustrates, in a broad sense, the occurrence of the species.

In addition to the economic importance of the family, some extremely interesting information becomes available when a census of the species is taken. The salient features, of an enumeration of this nature, are:

- (a) By species, one-third of the indigenous grasses of the State are to be found in this region.
- (b) By species, one-quarter of the local grass-flora is confined to the north-west of Victoria.
- (c) By species, nearly one-tenth of the total indigenous plant life of the region consists of grasses.

In this part of the State the family is so well represented that, with the exception of the sub-family Phalarideae, which is entirely absent, every other sub-family of the Victorian grasses is present. The sub-families which appear are represented as follow: Andropogoneae 1 species, Zoysieae 1 species, Panaceae 7 species, Festuceae 14 species, Agrostideae 13 species, Chlorideae 2 species, Aveneae 3 species, and Hordeae 2 species. From the foregoing summary it is evident that, in spite of the low average annual rainfall of approximately ten and one-half inches, there is ample variation among the species to enable one to gain an intimate knowledge of the family as a whole. These plants offer a fascinating combination of botanical features, but this is not all—many other equally interesting and instructive lessons of a varied and complex character present themselves. Briefly, among these, are the problems associated directly with the changing grass communities which are caused by constant over-grazing and burning; the problems connected with the extinction of certain species by the same means; the factors which are responsible for the reversion of the sere

whereby the best species are often replaced by inferior ones of poor forage value or even by inedible plants belonging to an entirely different family; and finally, the behaviour of exotic introductions which are possessed of drought-resisting qualities and consequently become acclimatized.

During the last half-century the grazing on pastoral lands along the Murray has continued incessantly with the result that, in many cases, the superior forage-grasses which dominated certain grass communities, have become sub-dominant or eliminated altogether. An example of this nature is to be seen in those communities which were originally dominated by "White Top" (*Danthonia* spp.). Species of the genus *Danthonia* have been superseded by harsh forms of the genus *Stipa*, which has become the dominant genus. In areas of this kind it is significant to observe that, where grazing has been withdrawn altogether for a number of years, the *Danthonia* exhibits indications of again assuming dominance. Further, the predominant species of a community—namely, *Digitaria divaricatissima*, has been occasionally replaced in status by a subdominant species, i.e., *Aristida arenaria* of the same community or by a dominant species, i.e., *Stipa variabilis* of a different community, with the result that the original dominant species of the community has become subdominant or entirely eliminated. The rare *Tragus racemosus* affords an excellent illustration of how excessive grazing can eliminate a species. During the past ten years I have failed to find a single plant of this species anywhere in the vast grazing areas of this region. On the other hand, this species (which is also recorded from Southern Rhodesia, where it grows as "a common annual on roadsides and waste lands"²) is to be seen as the dominant species on a limited area that has not been grazed in the past forty years. It therefore seems that if this species fails at this spot, the species can be considered to be extinct in Victoria, because it is confined to the north-west.

On some sandy rises it appears that the prevalence of *Zygophyllum* spp.—chiefly *Z. crenatum* and *Z. indocarpum* (both inedible species) is the result of a reversion of a sere in which species of *Danthonia* were originally the dominating plants. Unabated grazing has probably been responsible for a primary retrogression to grasses of the genus *Stipa*, and the continuation of severe grazing has brought about a further retrogradation to species belonging to the genus *Zygophyllum*. It can be readily appreciated by an example of this sort that grazing land can be easily ruined by improper grazing procedure.

Paspalidium jubiflorum, an introduction from New South Wales, has taken complete charge of the lower grey soils along the Murray

* *The Grasses of Southern Rhodesia*, by S. M. Stent and J. M. Rattray, 1933.

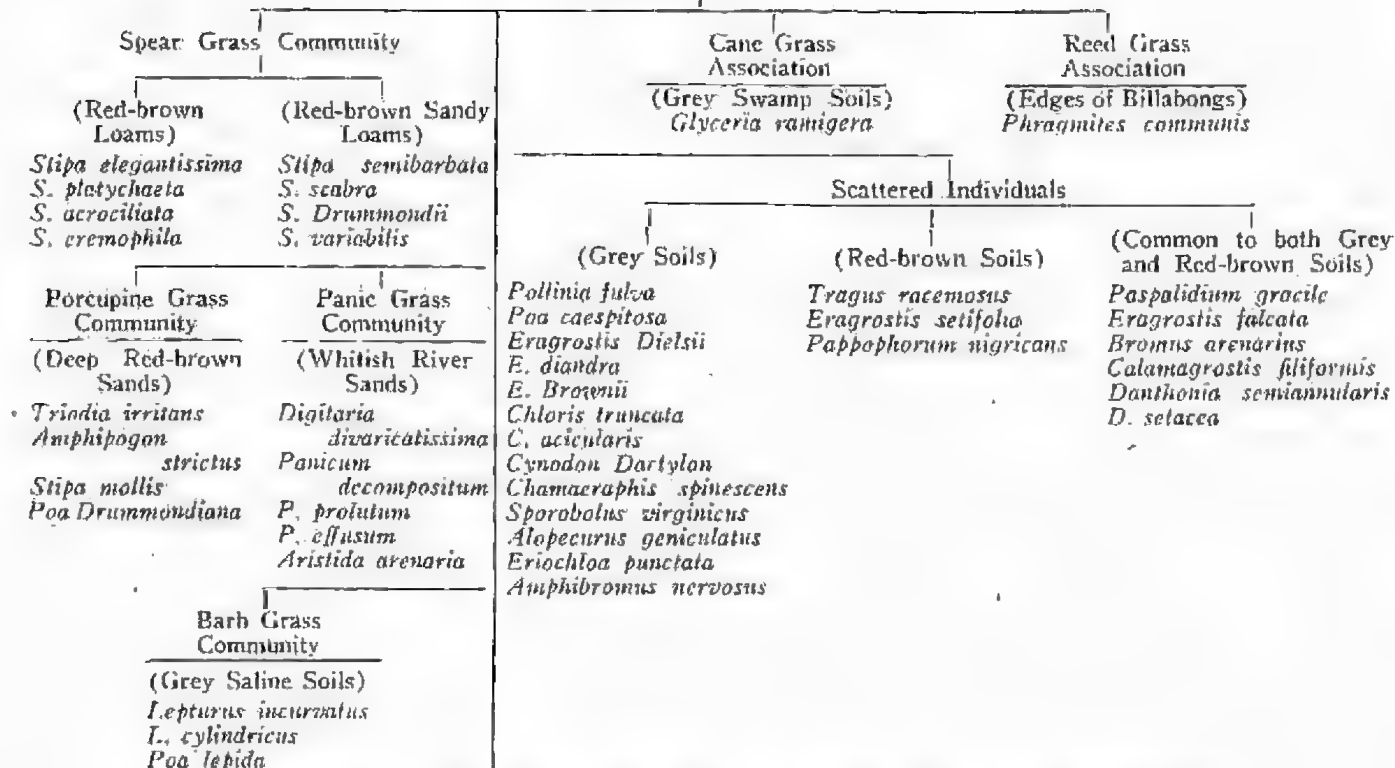
where annual inundation takes place. This is an illustration of restricted adaptability because the species has not been able to become established on the adjoining red soils where plant life depends upon the sparse and irregular rainfall. On the other hand, *Schismus barbatus*, an exotic species which was introduced into Central Australia, appeared in the north-west of Victoria in 1928 and since then it has spread throughout the entire north-west of Victoria, as well as the western portion of New South Wales. This species has definitely proved to be a useful acquisition to the flora of the country on account of its ability to respond to small precipitations. As well as being a fodder of average value, its capacity in holding together incoherent soils is of no small importance.

There seems to be a good deal of evidence to support the theory that some indigenous grasses—namely, *Poa caespitosa*, *Sporobolus virginicus* and *Alopecurus geniculatus*, have reached the north-west by the process of transportation of the waters of the Murray and its tributaries. Those species mentioned are probably later arrivals than the restricted grasses of the grey soils of the Murray such as *Eragrostis diandra* and *E. Dielsii*. Being of a moisture-loving character, the former species would not be likely to select a direct route from the south by way of the arid sandhills where the *Triodia irritans* community flourishes under the most adverse conditions that are to be found in the north-west. It is of interest to notice in the *Triodia irritans* community how one grass-species can protect another. Here, *Poa Drummondiana*, a perennial grass of extraordinary beauty, has taken shelter within the spiny tussocks of the *Triodia*, where it is making its last stand against the overwhelming aggression occasioned by sheep and rabbits.

Although annual grasses can exist over droughty periods as seeds, it is an irrefragable fact that, if the opportunity to form seed is frustrated by the characteristically severe grazing of this region, the species must slowly proceed towards the state of extinction. It is, therefore, evident that the preponderating cause of these changes in status of individuals in a plant-community is directly attributable to severe over-grazing.

I have followed the nomenclature of the grasses as set out in the *Flora of Victoria*, by the late Professor A. J. Ewart.

GRAMINEAE FAMILY



DIAGRAMMATIC ENUMERATION OF THE INDIGENOUS GRASS-SPECIES,
OF THE FAR NORTH-WEST OF VICTORIA

GEOLOGICAL NOTES ON PORTLAND DISTRICT

By ALAN COULSON, M.Sc.

Several rather unusual geological features are to be seen around Portland. The most notable, to my mind, is a splendid natural section of a volcanic vent. This is at "The Wells," on the west side of Cape Grant. The crater is 150 yards wide, and its walls of hard, glossy basalt still stand, despite the battery of heavy seas. The throat of the volcano is filled with agglomerate of limestone pebbles, ash and scoria, while the towering cliffs are composed of sloping beds of scoria and ash.

Offshore from Point Danger is the double islet of the Lawrence Rocks, of basalt and scoria, probably another small volcano. A mile width of shallow water separates it from the mainland, but probably the two were connected in earlier times. The detritus from this severed land bridge is to be found at Pebble Beach, where for over a mile there stretches a remarkable ridge of rounded basalt pebbles, up to ten feet thick, and resting, apparently, on a sandy bottom. The noise made by the rolling pebbles when a wave recedes is remarkable; often, however the pebble ridge is above wave level and much of it has therefore been thrown up during storms.

What is often locally referred to as "the river of bluestone" can be easily identified at Tyrendarra, where it forms a lava barrier across the road halfway between Portland and Port Fairy. It started from a volcano near Macarthur, the basalt flow filling the valley of a stream flowing south into Portland Bay. The drainage then divided, and lateral streams developed—the Fitzroy River, on the west side of the lava, and Darlot's Creek, on the east. They unite a few miles before they reach the sea.

An interesting, though rather inaccessible, deposit of diatomaceous earth occurs on Bell's Creek, Bolwarrah (five miles) and others near Gorae. Local opinion strongly favours the prospect of obtaining petroleum by boring, and several years ago the area was geologically mapped as a preliminary to private exploitation, but support failed before boring was commenced. At present it is impossible to venture an opinion as to the possibility of oil. The Government bores put down many years ago to 2,000 feet having failed to reach the base of the Tertiary limestone.

The district is not good for fossils or minerals, but a representative collection may be viewed at Mr. L. Kurtze's museum, South Portland. Coastal physiography is a fascinating study here, and some deep problems arise in connection with the origin and development of the inland dune limestone, dune lakes, etc. Generally the district is regarded as one in which uplift has recently occurred, and is probably still taking place. Certainly the growth

of beach ridges and coastal plains between Portland and Narrawong seems to support their view, and over near the South Australia border the evidence is very definite. However, between these places it is by no means convincing. Near Greenwald, on the banks of the Crawford, or Smoky River, some enormous landslips have occurred, and probably more will appear after every heavy rain. The underlying Tertiary clays are very greasy when wet.

The "bush" is rather scrubby, with Stringybark and Messmate, grass-tree and heath, and a number of species of tea-tree. Considerable differences exist in the vegetation of the basalt soils and that of the sandy soils, and in general it is found that only the basalt soils are worth cultivation, the chief crops being apples, potatoes and tomatoes. Curious "crab-holes," "run-away holes" or "swamps" occur in the basalt country, due to solution of the underlying limestone. When drained, these make excellent vegetable gardens.

Underground water is easily obtained, and the town supply is pumped from a bore about 400 feet deep. It is "hard" water, containing considerable amounts of lime and magnesia. The unique exposure of Tertiary limestone in the cliffs at Portland—there is no other coastal exposure for over fifty miles—has been responsible for the development of the magnificent surfing beach which is Portland's pride.

As might be expected, the overseas periodicals that come to us very rarely contain matter specially interesting to our members. Now and again, however, there appears a paper of general interest, as in the latest number of *The Philippine Journal of Science*. This is devoted to the Philippine Mushrooms, but deals also with Fungi generally in a most comprehensive way. There are references historic, to the superstitious beliefs concerning them, to the features carried by poisonous species, those of the genus *Amanita* being the most notable, to the poisons, the symptoms produced by them, and their treatment. Their methods of culture are described, recipes for their preparation for the table are given, of preserving them either for food or for study. The paper is abundantly illustrated, and will well repay study by budding fungologists.

EXCURSION TO ROYAL PARK CUTTING.

Known to Melbourne geologists for many years, the fossil fauna of the marine Tertiary sediments exposed in the railway cutting lured more than 20 members to Royal Park on May 14. During the course of the excursion a number of more or less fragmentary specimens were collected from the ferruginous grits and sands of the cutting, and the geology of the immediate area was ably summarized by Mr. F. S. Colliver.

In considering the stratigraphical position of the fossiliferous beds, it was pointed out that, with a palaeontological hiatus indicative of the immense discrepancy between their relative ages, they overlie the Silurian sediments exposed in a comparatively recent quarry face a little to the west of the cutting. They were also shown to be younger than the very much decomposed Older Basalt examined at the south-western end of the cutting. While the latter was in turn claimed to be younger than the Lower Tertiary leaf beds, which occur to the south of Flemington Bridge, near Sutton Street, and hence were not examined. It was also mentioned that the marine sediments of the cutting, not without some dissent, have been separated into two series on palaeontological grounds, though, possibly due to the irregular character of the bedding of the material and its subsequent impregnation with iron oxides, there does not seem to be any definite stratigraphical break.

Even though the Royal Park area was geologically mapped as early as the year 1860, rival views concerning the age of the series are still in existence. The question being complicated largely by differing ideas regarding the existence of two series in the cutting, by the disputed stratigraphical position of related series in other parts of Victoria, and by divergent correlations of the Tertiary rocks of Victoria with their overseas equivalents. As a means of obviating the necessity of referring to Victorian rocks in terms of the contested European nomenclature, among others, the terms Janjikian and Balcombian—grouped later as Barwonian—were coined. Unfortunately, one school claims that the Janjikian series underlies the Balcombian, and a rival school holds the opposite view. And further the former contestants place the whole of the Barwonian series in the Eocene epoch while the latter refute the presence of Eocene rocks in Victoria, placing the Balcombian series in the Oligocene, and the Janjikian in the Miocene epoch. Hence it is not surprising to learn that the Royal Park beds were once regarded as belonging to a single series, placed in the Lower Pliocene. They later became separated into two series, a lower, Janjikian (Eocene) and an upper, Kalimnan (Miocene) series; only to be again grouped and relegated to the Oligocene. And lastly, the lower series was placed in the Barwonian, to be subsequently particularized as Janjikian (Lower Miocene), while the upper series again became Kalimnan (Lower Pliocene). So that, for the present the lower series may be regarded as Janjikian, either Eocene or Miocene, and the upper series Kalimnan, either Miocene or Lower Pliocene, in age.

It may be mentioned that the fossils of the lower series were found to be casts preserved in a hematitic ironstone matrix, occurring most commonly a little above the junction of the ironstone with a white sandy clay not impregnated by the iron-bearing solutions. Among the fossils to be obtained from this bed, *Cerithium flemingtonense*, a gastropod named after the locality by Professor McCoy as early as 1876, is probably the most common. And, although the Mollusca easily predominate, fossil forms belonging to the Foraminifera, Anthozoa, Bryozoa, Brachiopoda, Echinoidea and Crustacea occur, together with an occasional Selachian tooth. In the limonitic material of the upper series, near the top of the cutting, very few fossils are to be found, and nearly all belong to the Mollusca.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, August 8, 1938. The Senior Vice-President, Mr. Geo. Coghill, presided, and about sixty members and friends attended.

Mr. Coghill apologized for the absence of the President, Mr. R. H. Croll, not yet returned from Central Australia, and Mr. E. E. Pescott.

The subject for the evening was a lantern lecture by Mr. Ivo. Hammett on "The Cultivation of Australian Wild Flowers." Slides from photographs by Mr. H. T. Reeves were shown. Much information of a practical nature was given. The Chairman expressed the Club's thanks to Messrs. Hammett and Reeves.

CORRESPONDENCE

From Geelong Town Planning Association, thanking the Club for its work in the Dog Rocks Area.

From Mr. A. T. Latham, thanking the Club for its letter of sympathy.

From Australian Youth Council, re one-day hike, and inviting members of the Club to take part in it.

From North Queensland Naturalists' Club, asking for assistance in its forthcoming Wild Nature Show (September 3 and 4).

From Gould League of Bird Lovers, regarding protection of birds. It was resolved that the Club assist the League in any way possible. In a second letter the League had referred to the Centenary of Gould's landing in Australia, requesting members of the Club to loan exhibits for the exhibition to be held in connection with the celebration.

From Mr. Noel Lothian, giving information on botanical subjects.

REPORTS ON EXCURSIONS

Excursions were reported on as follows: Sherbrooke, Mr. A. B. P. Underwood; and Black Rock, Mr. T. S. Hart.

ELECTION OF MEMBERS

Mr. A. D. Hardy, on the motion of Mrs. Charles Barrett, seconded by Mr. Barrett, was elected an honorary member of the Club. Mr. Hardy thanked the members for the honour, and mentioned interesting facts concerning the Club in the early days of his membership.

Miss Harvey Brown and Mr. Alfred A. Baker were elected as ordinary members; and Mrs. J. L. Matheson as country member.

GENERAL BUSINESS

Mrs. V. H. Miller referred to the recent discovery by Mr. A. H. Chisholm, in England, of a number of John Gould's letters and John Gilbert's diary.

Mr. F. S. Colliver reported that Mr. A. Holland, a country member at Avon Plains, had presented to the Christian Endeavour Convention a large quantity of wattle and that, on Mr. Holland's behalf, he had made the presentation to the delegates.

Mr. A. D. Hardy spoke on the condition of some of our National Parks, due to grazing. It was resolved to refer the matter to the Committee.

WILD NATURE SHOW

Mr. G. N. Hyam reported that Mr. A. D. Hardy had agreed to act as Show Secretary, and appealed for all kinds of exhibits, especially those of a novel nature. He further stated that the Shell Company of Australia would again stage an exhibit.

EXHIBITS

Miss Ivy Dixon.—*Castanospermum australe* (Queensland Bean), and Razor Shells (*Solen* sp.), from Dunk Island, Queensland.

Mr. T. H. Harris.—Aboriginal Stone Implement, from Kingston, South Australia.

Mr. H. T. Reeves.—Pressed Wild Flowers of Western Australia.

Mr. V. H. Miller.—*Vanda coerulea* (The Blue Vanda); also Aboriginal stone chips, collected at Ripley, Victoria.

Mr. H. P. Dicking.—*Pterostylis grandiflora*.

Mr. H. C. Stewart.—*Imantsia tannensis* (Fern Clubmoss), collected from a tree-fern at Sherbrooke.

Mr. F. S. Colliver.—Specimens of wood from Central Australia.

Mr. F. S. Colliver would be pleased to receive complete specimens, including roots and basal leaves, of the Austral Bluebell (*Wahlenbergia gracilis*, A. DC.) from as many localities as possible.

Mr. W. A. Steel, 16 Upsdell Avenue, Palmer's Green, London, N.13, England, wishes to exchange British and European Coleoptera for Australian species. He is interested especially in *Staphylinidae* and *Carabidae*. He is willing to collect British insects of other orders, if desired, in exchange for beetles.

Plate V



Photo. H. T. ROGERS.

Hill Banksia (*Banksia collina*)

GEMS OF THE AUSTRALIAN FLORA

Some Notes on their Cultivation

By Ivo C. HAMMET

In writing these few notes on the cultivation of Australian plants, I cannot help feeling that the pages of a gardening journal would be more suitable for purely cultural hints than a popular scientific journal such as *The Naturalist*. There is, however, much which is of interest scientifically in the cultivation of Australian plants. One is continually receiving surprises. It is very noticeable that, after several generations in the garden, certain native plants become amenable to garden discipline. But little seems to have been done in this direction, and it is regrettable that more records of their experiences have not been kept by growers.

In Robert Sweet's *Flora Australasica*, published in 1827, we have "A full account of the best method of cultivation and propagation" of Australian plants. In his time the growing of plants from New Holland was very popular, despite grave climatic difficulties, but, apparently, as the novelty wore off and the obtaining of specimens became easier, the craze died out. But even to-day, we may learn from the grower abroad. Who among us would grow, as is done abroad, *Eucalyptus globus* as a pot plant for the sake of its beautiful juvenile foliage, or have as a table ornament a pot plant of *Grevillea robusta*?

It is very evident that we are on the eve of a revival in the cultivation of Australian Flora. One notices increased interest everywhere. This is due, possibly, to greater facilities for obtaining specimens. The most beautiful Australian flowers are, generally speaking, those which come from the remote parts of Western and Central Australia, and in earlier days the obtaining and transporting of specimens was fraught with great difficulty, and even danger. With the advent of aeroplane and motor car, all this has been changed. One may obtain a rare plant at Alice Springs and have it safely growing in his garden a few days later. Still, there are problems to be solved.

I recollect reading in a daily paper, last year, an article on "Flowers of the Inland." In it was described Australia's cotton plant—*Gossypium Sturtii*, commonly called Sturt's Desert Rose, or, as the writer called it, "The Queen of the Inland." At once desire to possess *Gossypium* was aroused, and difficulties were faced. A knowledge of its habits was necessary, but a reference to Turner's *Forage Plants of Australia* gave much information regarding the cultivation of *Gossypium*. "The plant will flourish even in the driest seasons, but it does not flourish away from such situations. More than one attempt has been made to grow it on the coastal side of the Dividing Range, and although it succeeded

well during the summer months, still directly the autumn rains set in the plant looked unhappy and eventually died." And yet, in a recent catalogue from a Californian nursery, plants of *Gossypium Sturtii* were listed with over 60 species of Australian plants, of which 20 were dwarf flowering Eucalypts. If Americans can grow it, why not Victorians?

Our American friends have a keen sense of values. I know of no better subjects for the ordinary suburban garden than the dwarf W.A. Eucalypts which they list. Mr. H. T. Reeves has some beautifully coloured lantern slides of them which were shown at our Club's last meeting. Illustrations give but a faint idea of the beauty of these Eucalypts; they must be seen in their natural setting to be fully appreciated.

It must not be thought that the growing of Australian Flora is of interest only to the botanically minded naturalist. Recently, when passing by a Golden Wattle (*Acacia pycnantha*), my curiosity was aroused by the loud humming of bees. The tree was not yet in bloom, but a close investigation revealed hundreds of bees, attracted by the secretion from the tiny gland which is found at the base of each leaf. A natural banquet, which, later in the year, is eagerly sought for by different species of ants.

Eucalyptus caesia is in full bloom in mid-winter and is crowded each day with wattle birds and the ubiquitous "Greenie," or White-naped Honeyeater.

The late A. J. Campbell, in *The Australasian*, 23/1/97 (page 180) stated: "I have a serious charge to prefer against the 'Tawny Honeyeater.' . . . During certain seasons they regale themselves too freely with the seductive nectar of the flaming bottle brush (*Callistemon*). They become tipsy and are easily caught by hand under the bushes. In the annals of ornithology, I know of no other instance of birds getting intoxicated."

A reproduction, in black and white, of *Eucalyptus erythrocorys*, gives no indication of the marvellous colouring of the flowers. This is what C. A. Gardner, a West Australian botanist, says of it: "A rare species and of small stature. It is perhaps the most ornamental of all the Eucalypts and is deserving of cultivation throughout the world."

It is remarkable that this species, admittedly the finest of all flowering Eucalypts, has no popular name, as far as can be ascertained. Mr. Reeves calls it the "Red-capped Gum"—a very suitable appellation. A gum tree, the flowers of which are greenish-yellow, the fleshy, ribbed calyx a vivid green, and the ridged operculum a bright scarlet, provides a study in contrasts which, combined with its ease of cultivation, undoubtedly make this the gem of the wildflower garden.

The editor of our journal, Mr. Charles Barrett, who recently returned from Central Australia, presented me with a plant of



Photos.: H. T. Reeves.

Above: *Eucalyptus caesia*,
Below: *Eucalyptus crythrocorys*.

Parakeelya (*Calandrinia balonnensis*), a member of the Portulaca family. It is an extremely valuable fodder plant in the Interior. G. A. Bolam, in his *Trans-Australian Wonderland*, mentions that a pony of his lived for a considerable time and grew fat on a diet of this plant; it had no other water supply, and he quotes a case of cattle living for two years on a diet of this plant with practically no water. Parakeelya is a most beautiful plant, the showy flowers brightening many desert areas with their amethyst colouring. My little pot plant will, I trust, be the parent of many others and thus bring Parakeelya into general cultivation in Victoria.

The foregoing remarks have been inspired by a conviction that there is much of scientific interest to be learned by the growing of Australian wildflowers under garden conditions, and by studying the reaction of the plants (and their associates of the animal kingdom) to the altered environment.

For instance, why do Blackbirds destroy the pitchers of the Western Australian Pitcher Plant (*Cephalotus follicularis*)? Is it just destructiveness, or are they attracted by the insects which the plant has rejected? When I pass by a plant of the White-plumed Grevillea (*Grevillea leucoptervis*) in full bloom, with its offensive perfume very apparent, I look for pollination by flies; but of this there is no evidence.

In conclusion, I would say to those who decide to grow Australian wild flowers that most of them are easy to cultivate, their main enemies being "wet feet" and wind. Efficient drainage and staking are essential. Care is necessary when weeding to see that their root system is not disturbed, as they resent interference.

A knowledge of their habits is desirable, as they succeed best where their natural environment is most closely imitated.

GOULD CENTENARY

October number of the *Naturalist* will be devoted mainly to John Gould, author of *The Birds of Australia* and many other great works. The centenary of his arrival in Australia is being celebrated in several of the States. The Gould League of Victoria will hold an exhibition in Melbourne High School, and the Club may be represented by an exhibit.

The Club Committee has authorized the editor to include a colour plate, a reproduction in miniature of one of Gould's folio plates, in the October issue. A notable contribution has been received from Mr. Alec H. Chisholm, at present in England. He was fortunate in discovering a mass of unpublished Gould material, including letters.

WHEN WINTER COMES

By BLANCHE E. MILLER

Some well-informed bird-men assert that for much of the year there is little field-work of special interest, as the majority of our birds have finished nesting long before summer is over. However, after the rearing of broods, there is much movement in the bird world during the autumn months, and while admitting that when winter comes the bird lover's activities are considerably restricted, there are, undeniably, compensations. Always there is the lure of the lyrebird in the ranges to the east of Melbourne, and my experiences convince me that even in other directions winter is the season when we may expect the unexpected. Birds still live, and often have to consider ways and means of doing so. On any day, throughout the year, one may have new incidents brought under notice, and in natural history, a field observation impresses a fact on the mind more clearly than does the perusal of text books.

Late last autumn, when passing through Hastings, a village on Western Port Bay, we were surprised to see numbers of Eastern Curlews, *Numenius cyanopus*, for Easter marks, approximately, the departure of the true migratory waders, on the great trans-equatorial flight. When the local fishermen informed us that some of the Curlews stayed all the year round, it seemed likely that there was an error, despite the fact that the large size of the bird, and of its long, curved bill, renders it one of the easiest of the waders to identify. A month later, the numbers of Curlews had not appreciably diminished, so a special journey was made in July, when we counted 60 resting at the water's edge, awaiting the turn of the tide.

Western Port Bay has vast areas of mud-flats that are uncovered at ebb tide, affording excellent feeding grounds, so it is reasonable to suppose that we did not see the total numbers of birds of various species still frequenting the Bay. Observers have noted the arrival of Curlews on the western shores of Port Phillip Bay during the first week in August, in other years. Is it not possible that the extent of their wanderings, in that year, was just from one feeding-ground to another? The ornithologists of an earlier generation knew that some Curlews were to be found throughout the year, and duly recorded the fact. Others have a theory that one year in five is a rest period. Our knowledge of the birds' movements is exceeded by that which we have still to learn. Possibly the mystery attached to their comings and goings somewhat overshadows unromantic facts.

There is a private property near Balnarring that is a sanctuary, and a large permanent swamp, with good cover, attracts many water-loving birds. From a vantage point on the road the field-

glasses give a provocative view, and one is strongly tempted to trespass. Recently we paused to survey the exposed portion of the swamp, usually well tenanted. Purple-breasted Coots walked sedately on the margins. In the distance we noticed white objects which we surmised were lambs, and were agreeably surprised to find were White Ibis. In some years the Straw-necked Ibis is fairly common even in winter, on the basaltic plains west of Melbourne, but the White species is much rarer, except where there is irrigation. It was good to see them so far south in mid-winter.

We are partial to cruising along by-ways at a snail's pace. A few weeks ago we "discovered" a road new to us, and passable even on wet days. Right beside the road, where the night's rain formed a small pool, we saw a Black-fronted Dotterel, the little country cousin of the seashore species. Usually Dotterells evade close inspection, but this one was quite indifferent, and did not resent our approach even on foot. A few hundred yards away we saw its mate at a dam which evidently had a permanent supply of water, seeing that a wind-mill and tank had been erected. Possibly the Dotterells may stay, but usually they prefer the stony edges of watercourses, rather than exposed positions for the laying of their eggs. Later in the day we observed the largest flock of White Cockatoos that it had ever been our good fortune to see. They were feeding on the ground, massed too closely for accurate counting, but we calculated that there were some hundreds. The following week we decided to travel over the same road, but in the opposite direction. The Cockatoos were still in the district, but were on the opposite side of the road. About a mile farther on there was a very much larger flock, which divided into two parties when disturbed. To give some idea of the numbers: those that alighted on trees created the illusion of an orchard in bloom; the smaller flock settling on a stack, covered it as completely as if giant hands had spread a new tarpaulin. Convinced that no danger was imminent, they posted sentinels at strategic points, and returned to their digging of onion weed—or was it onion grass?

Since our visit in the previous week, many small waterholes had been filled. At one, we saw a male Maned Goose and two females. While we remained in the car they appeared not to notice us. Opening the door on the farther side, I got out, and although well hidden from his view, the male bird became alert with apprehension. Some intuition caused him to raise and flatten his mane, and yet remain otherwise immobile until we actually showed ourselves. It is a matter for regret that it is not always possible to follow up an observation, and read from Nature's book the succeeding chapters. The text books tell us that Wood Ducks, as they are sometimes called, are usually in

Plate VI



Flashlight photo. by Ronald K. Menro.

Boobook Owl (*Ninox boobook*)

flocks or pairs. On the eve of their nesting season, three birds in a party causes some little speculation.

A few years ago we were travelling along a little-used road across the plains immediately after the first good fall of rain had replenished waterholes after an exceptionally dry autumn. Every pond had its quota of bird life. Even the water that had collected temporarily in cultivated fields was an attraction for quite large birds such as Black Swans and Chestnut breasted Shelducks. Some of the low-lying paddocks were transformed into lagoons with quite a population of Duck and Teal. Cormorants and Herons were also numerous. It was a practical lesson of just what the rain means to the water-frequenting birds. Small wonder that in the fullness of his knowledge one of our leading ornithologists is so fond of quoting the poet's lines:

"Hurrah for the rain,
The water is out in the swamps again!"

Passing over a culvert close to a farm house, we scarcely bothered to notice some supposed domestic ducklings, but interest quickened when they dived with alacrity, and in the unmistakable Grebe-like manner. Investigation showed that they were Grebes, and we were told that only a few days before there was not so much as a bucket of water at that spot. The nearest stream was some miles distant. Grebes, although expert divers, are not well equipped for sustained flight, nor are their lobed toes adapted for long sojourns on land, so the manner of their arrival, and subsequent departure, is a matter for conjecture.

This winter, when passing through Werribee, we stopped for some small adjustment to the car that would not take more than a minute. As many seconds go to these alleged "minutes," I decided to make some use of the time, and alighted. Directly opposite the swimming pool the right-hand bank of the river is very high and planted mostly with native flora, proving an attraction for birds. Scanning the reedy banks for water fowl, the glasses picked up unfamiliar bubbles on the water, quite unlike the snap of trout, and minus the resultant rings. The height of the bank may have added to the transparency of the water, and presently a dark moving form came into view as a large Platypus swam lazily on the surface, within a stone's throw of the Highway. Bubbles at various points gave evidence that the monotreme was not a solitary specimen.

It was near Werribee last winter that we picked up a freshly killed Owl. Ordinarily we might have roughly decided that it was a Boolook, but, inspired by "the divine quest for knowledge," I decided that the Owl would serve admirably for a lesson at the Nature Study Class on the correct method of measuring a bird. Subsequently the fact was brought to light that the



Spotted Owls, *Ninox maculata*. After Gould.

supposed Boobook was actually a Winking Owl. The natural sequence was that another Owl, found, this winter, on the Calder Highway, was duly footruled, and tentatively identified as a Spotted Owl (*Ninox maculata*) on account of its size, and the spotting of the interscapulum. In scientific ornithology, "a bird in the hand is worth two in the bush" when it comes to the positive determination of a species; so the Owl was duly submitted to the authorities and pronounced to be a Boobook! Another authority strongly disagreed, claiming that the specimen was undoubtedly a Spotted Owl, and that as it was admitted as a good Victorian species by the Checklist Committee, their findings could not be put aside offhandedly. Under such circumstances the student can but echo old Omar Khayyam asking:

"... What Lamp had Destiny to guide
Her little Children stumbling in the Dark?"

One of our most unforgettable experiences occurred a few winters ago. We had spent the day at the mouth of the Werribee River, and, on our return home, discovered that the camp stove had been left behind. We decided to get up very early the next morning and return for it. When we reached the picnic-ground it was still dark, and as the car turned, the headlights glimmered on the stove, exactly where it had been left on the previous evening. In daylight the spot is not exactly attractive, but mere words cannot convey the awesome feeling that possessed one, in that "darkest hour before the dawn," when not a living thing was stirring, and the only sound was the weird splash of waves. Instinctively, one crept like an animal into the comparative warmth and security of the car. Then the strangest thing happened. A Lark soared into the inky heavens and trilled a song of greeting to the dawn. Perhaps the headlights had, inadvertently, been trained on it where it slept, and it woke to find the bright light shining full upon it. Not for a full hour did the sun outline the eastern hills with golden pencil, intimating that another winter's day had begun.

Inadvertently, in the report on the Club's visit to Baron von Mueller's grave, Mr. Geo. Coghill's name appeared as "Mr. Geo. F. Coghill."

THE BARKING SPIDER

By CHARLES BARRETT

Among the living specimens brought to Melbourne recently for the Northern Territory Exhibition were several Barking Spiders (*Selenocosmia stirlingi* Hogg) from the Macdonnell Ranges. They were collected by aborigines at Jay Creek, about thirty miles from Alice Springs, and were in my care for nearly a month before, and a fortnight after, the Exhibition. At no time were they heard "barking" or producing the whistling sounds attributed to them. But there can be no doubt that these big, formidable-looking spiders do make a shrill noise by stridulation: the palps being rubbed against the mandibles.



Barking Spider, *Selenocosmia stirlingi* Hogg.

The late Sir Baldwin Spencer gives an account of the Barking Spider in the *Narrative* of The Horn Expedition, and also in his books, "Across Australia" and "Wanderings in Wild Australia." He and one of the operators "listened in" one night, on a small flat in the scrub some miles from the Alice Springs telegraph station. They heard, not a "barking," but a "booming" sound; probably made by a Quail. Some of the spiders were dug up, and the professor kept them in captivity. He heard no "barking," but discovered that the female *stirlingi* has stridulating

organs, and produces "a slight but distinctly audible whistling sound."

Barking Spiders, or Whistling Spiders, as it is suggested they should properly be called, abound in many parts of Central Australia. I have seen scores of their burrows, or rather the entrances to them; and many examples of *Selenocosmia shirlingi* have been brought to me by aborigines, who always handle them with great care lest they be bitten. The spider is seized above, at the junction of cephalothorax with abdomen. Though not known to be deadly, these large and powerful arachnids must surely be very poisonous, and their bite might have serious consequences. My captives were not aggressive, though reacting quickly to a touch with a twig or my forceps. Rearing in the manner usual among Trapdoor Spiders, they remained for a while ready to strike, then lowered the upraised body and front pairs of legs, and sulked or moved away. One does not like teasing even a spider, but, for the sake of photographs, my Barking Spiders were occasionally made to rear. In this attitude, according to Spencer's observations, the whistling sounds are produced, with "keyed" palps and spined mandibles. I was eager to hear the "voice of the spider," but listened for it vainly.

Camping out in haunts of the Barking Spider, I became familiar with night sounds, though the origin of some of them was puzzling. None could be credited to *Selenocosmia*; neither bark nor whistle broke the moonlit silence. Yet one morning the blacks came in with seven Barking Spiders, all captured in the vicinity of the camp. There were plenty of their burrows in that locality: holes on the surface leading into the underground homes. About one inch in diameter, they vary in depth from ten or twelve to eighteen inches. At the end of the burrow is the spider's den—a small round chamber where it lurks during the daytime, coming to the surface at night to hunt for its prey, chiefly large beetles and other insects, judging from the remains of victims found in burrows.

Interest in spiders is increasing, and recently some very interesting papers on the habits of Australian species have been published. In the current issue of *The Australian Museum Magazine* Miss V. C. Levitt records her observations on *Sidyra longipes*, which probably is familiar to some members of our Club. It belongs to the same genus as the Leaf-curling Spider (*S. wagneri*), so common in Melbourne gardens, and rolls leaves into "containers" for its egg-sacs. We have life-histories of comparatively few Australian spiders, and there is a vast field for the observer.

FOSSIL COLLECTING IN THE LILYDALE DISTRICT

By REV. EDMUND D. GILL, B.A., D.D.

To examine the richly fossiliferous strata of the Lilydale district is to uncover a fascinating marine life of many millions of years ago. Being Upper Silurian in age, this primitive fauna presents striking contrasts with that in our modern seas. There are no fish, the highest group of organisms being the Trilobita. Another interesting fact is the presence of an ancient coral reef, which indicates that the climate was then far warmer in these latitudes than it is now. Corals require a minimum water temperature of 68° F., and a depth of clear water not exceeding 20 fathoms. Thus the corals also indicate that the rocks were formed in comparatively shallow water.

Around modern coral reefs the sea is milky for some time after a storm, due to the presence of coral-flour produced by the pounding of the reef. Also fragments of coral, of all sizes from sand to great blocks broken off the reef, are strewn over the sea-bed. From such material the stratified limestone of Cave Hill has been formed (see illustration). Preserved in these rocks are the remains of typical coral-reef inhabitants such as are found in similar deposits in Europe and North America. Some fifteen corals (especially *Favosites*) and a number of stromatoporoids have been collected at Cave Hill. Ostracoda and remains of sea-lilies are common. Gasteropoda and other shellfish are associated with the corals as is the case in the reefs of the present day. The commonest of the Lilydale Gasteropoda are the plano-spirate *Euomphalus*, the trumpet-mouthed *Bellerophon*, the elongate *Coelocaulus*, and the turbinate *Cyclonema*. Quite a few Pelecypoda have been found, but only one Brachiopod—the ubiquitous *Atrypa reticularis*! No Trilobites lived on that ancient reef, for they preferred a more muddy environment.

So it is that when one moves a quarter of a mile west from Cave Hill to the mudstones outcropping on the Mooroolbark Road, one finds a different assemblage of fossils altogether. The Trilobites (*Phacops* and *Homalonotus*) are plentiful, and also the Brachiopoda, particularly *Spirifer lilydalensis*. Elegant Pteropoda like *Conularia* and *Tentaculites* appear, and the Polyzoan *Fenestella*. Pelecypoda are well represented, but the Gasteropoda, which are so plentiful in the limestone, have not yet been found in these red mudstones.

Probably the most rewarding locality of all for the collection of fossils in the Lilydale district is Ruddock's Quarry, a few miles north-west of the township. It is in Edward Road, a little north of its junction with the road which extends west from the cemetery. The strata consist of thin brown mudstones dipping at about 30° East. The Ruddock's Quarry faunule is rich in



Cave Hill Quarry, Ledydale. The impression of the *Leptæna* is clearly visible in the center as well as the *Leptæna* in the upper right corner.

Brachiopoda—*Atrypa*, *Chonetes*, *Crania*, *Cyrtina*, *Gypidula*, *Leptaena*, *Lingula* (not yet described), *Nucleospira*, *Orbiculoidea*, *Orthis*, *Rhynchotretra*, *Spirifer*, and *Stropeodonta*. Associated with these is an interesting group of Trilobites covering the genera *Goldius*, *Calymene*, *Cheirurus*, *Odontopleura*, *Phacops* and *Proetus*. Pelecypoda are found, and some Gasteropoda, but of quite different forms from those at Cave Hill. The solitary coral *Lindstroemia* is plentiful, as well as the delicately branching coral *Romingeria*. The Ostracod *Beyrichia* is also a member of that faunule.

The brown mudstones of Ruddock's Quarry, with their characteristic fossils, are found in a number of outcrops as one proceeds northwards to the River Yarra. The writer has discovered these beds outcropping on the ancient bank of the Yarra in Warren's property at the end of Edward Road. Yet another type of fossiliferous strata is found at Coldstream, on the west bank of the Olinda Creek. These consist of massive yellow mudstones. Fossils are not nearly so abundant as at Ruddock's Quarry, but there have been collected the corals *Lindstroemia* and *Pleurodictyum*, the Brachiopoda *Leptaena* and *Orthis*, the Gasteropoda *Platyceras* and *Pleurotomaria*, and the Trilobita *Cheirurus* and *Phacops*.

Lilydale is the type area for the Yeringian horizon of the Victorian Silurian.

LIGNITIC CLAY AT PORTLAND

The Editor, *The Victorian Naturalist*.

Dear Sir,—My attention has been drawn to a report on page 56 of the July issue of your journal (Vol. LV, No. 3) in which the following statement appears:

"Here most of the material in the cliff is dark brown in colour due to impregnated bitumen, most likely derived as the residue of an oil seepage with evaporation of the volatile fractions."

This refers to the cliffs near the "Jarosite" works at Point Addis. In view of the activity that centred round the oil possibilities in this district some years ago, and the desirability of having all likely oil indications investigated, one of the geologists of this Department visited the area on Saturday last, August 6, and it may be of interest to your readers and Club members to know that he reports as follows:

"I find that there is no justification for regarding the dark brown material at the base of the cliffs as being bituminous. It may properly be described as a lignitic or carbonaceous clay, and it is identical with the stratum which is exposed under similar conditions at other parts of the coast between Point Addis and Anglesea. At several points there are small water seepages, and the effect of the moisture on the lignitic clay is to give it a glazed appearance which enhances its superficial resemblance to bitumen."

Yours faithfully,

GEO. BROWN,
Secretary for Mines.

Melbourne, August 10, 1938.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, September 12, 1938. The President, Mr. R. H. Croll, presided, and about 120 members and friends attended.

The President thanked members for electing him to office during his absence in Central Australia.

The subject for the evening was a lecture, "Wanderings in Central Australia," given by Mr. R. H. Croll. Illustrations took the form of motion pictures taken by him on several different trips, and these, together with a commentary, formed the basis of a very interesting lecture. Mr. Croll extended the thanks of the Club to the Victorian Railways Betterment Board for assistance in the picture projection, and welcomed the many visitors, including some country members, to the meeting.

CORRESPONDENCE

From Mr. J. A. Kershaw, thanking the Club for its letter of sympathy.

From the United Press, re forthcoming wild nature publication called *Wild Life*.

From the Gould League, re Bird Day celebrations

REPORTS OF EXCURSIONS

Excursions were reported on as follows: Technological Museum, Mr. G. N. Hyam; Langwarrin-Frankston, no report; Willsmere Park, Miss Raff; Kinglake, Mr. Ivo Hammett.

ELECTION OF MEMBER

On a show of hands Mr. A. Driver, of Korumburra, was elected as a country member.

GENERAL BUSINESS

The attention of members was drawn to the Baron von Mueller Memorial Fund. Subscriptions were invited.

Show Business.—Mr. A. D. Hardy outlined progress made to date with the Wild Nature Show, and invited all members to assist. Exhibits, especially of a novel nature, were wanted.

It was announced that the Butterfly collection of Mr. A. N. Burns would be on display at Box Hill on September 29, 1938.

NATURE NOTES

Mr. Ivo Hammett spoke about the lack of Musk scent in *Olearia argyphylla*.

Mr. A. A. Brunton spoke of the behaviour of a Lyre Bird. The bird attacked visitors when it had a chick in the nest, in a similar way to the domestic fowl.

EXHIBITS

Miss Ida F. Knox.—Water colour painting of Fungi from Sherbrooke Forest.

Miss Mary M. Knox.—Lignite from Bunyip Creek.

Miss J. W. Raif.—Specimens from Central Australia, collected by Mr. Croll, including a mixed lot of insects and a large coccid gall on a Eucalypt; specimen of *Apis* from bottom of a fresh-water pool at Palm Valley, Central Australia; and Ticks found on Hill Kangaroo at Simpson's Gap, near Alice Springs.

Miss A. Atkinson.—Pressed and mounted wild flowers from Tasmania.

Mr. R. H. Croll.—Fossil mollusca from the cretaceous of Coober Pedy.

Mr. D. J. Patton.—Two forms of *Acacia leprosa*, one from Bendigo, and the other from Dandenong Ranges.

Mr T. S. Hart.—Germinating seeds of Mistletoe from specimen collected by Mr. Colliver in Central Australia.

Mr. F. S. Colliver.—Specimens illustrating the geology of the Tennant Creek gold field.

GOULD'S ILLUSTRATIONS

John Gould's success as a pictorial ornithologist was due to the publication of a series of beautifully illustrated bird books. Similar works, on so large a scale, had never previously been attempted by any other birdman, and when his first, *A Century of the Birds from the Himalaya Mountains*, appeared in 1831, it was a great success. The birds were figured in their natural size and were life-like and depicted in their natural attitudes and colouring.

The illustrations were produced on stone and coloured by hand, and for this reason all of Gould's works were in editions limited according to the subscription lists, *The Birds of Australia* being restricted to 250 copies, and only a few of his other works exceeding this number.

In order to illustrate the birds in their natural surroundings, Mrs. Gould, while in Australia, made sketches of hundreds of botanical specimens. These were afterwards used to advantage when illustrating the family of Honey-eaters and other birds.

Gould, himself, sketched many of the plates, and an examination of *The Birds of Australia* reveals that at times he has drawn a bird in an unnatural attitude in order to display certain markings in its plumage. In a few instances certain birds, whose habits are usually confined to the ground, are displayed perched on trees, but, excepting these minor defects, the illustrations in all Gould's works are excellent.

Gould's activities as an author and publisher extended over a period of fifty years. His numerous folio works contain over 3,300 coloured plates, illustrating birds from practically every part of the world. A number of the plates in his *Monographs* were afterwards used in his *Birds of Asia*. All his works were issued in parts and over long periods. One extended over a period of 32 years, but most of the others were completed in about ten years.

D. DICKSON.



Buff-sided Scrub Robin, *Drymodes superciliaris* Gould

OUT OF THE PAST: GOULD MATERIAL DISCOVERED

By A. H. CHISHOLM

Unpublished material relating to John Gould, the "father" of Australian bird-study, has hitherto been somewhat rare. At the present moment, however, I am almost dazed by the wealth of such material surrounding me. My table here in London is covered with it. All this is the result of the committee of the Field Naturalists' Club of Victoria having suggested that, while visiting England, I should make an endeavour to discover "new" Gouldiana, for use in connection with the centenary of the bird-man's arrival in Australia!

In the first place, I made inquiries regarding Gould at certain scientific societies in London. These proving fruitless, I addressed a letter on the subject to *The Times*. The result was splendid. Aside from the fact that numerous correspondents supplied addenda of information, the letter brought me into touch with Gould's granddaughter, Mrs. Edelsten, and she in turn put me in touch with her sons, both country doctors, and they, after rummaging in family chests, produced all this material.

I have sent to the editor of *The Victorian Naturalist* a translation of an article by Salvadori which gives a general account of Gould's work. There is no need, therefore, to say anything more on that subject. On the personal side, however, a few particulars mentioned by Mrs. Edelsten may be set down. Gould had six children. Three—Eliza, Charles, and Louisa—were left behind with Mrs. Gould's mother, Mrs. Coxen, at the family home at Broad St., Golden Square, when John and Eliza Gould sailed for Australia in May, 1838. Another son, Henry, accompanied his parents. A third son, Franklin, was born on May 6, 1839, while Mrs. Gould was staying with Sir John and Lady Franklin at Government House, Hobart. A third daughter, Sarah (better known as Sai), was born in 1841, soon after the return to England; it was then, alas! that the talented Mrs. Gould died.

Further domestic misfortune overtook the family during Gould's lifetime. Henry and Franklin, who both became doctors, died young, the former in India and the latter (in 1873) in the Red Sea. Charles Gould, a geologist, became a wanderer over the face of the earth; I have seen letters from him to his sisters in London from Australia, South America, and various parts of Asia. Always he wrote most kindly and intelligently, and frequently he sent money home, at the same time urging his over-generous sisters not to give their money away so freely. Charles, incidentally, published a book entitled *Mythical Monsters*. He died at Montevideo in 1893. Small wonder that the wanderer's obituary notice in *The Times* contained the quaint invitation, "Japanese and Tasmanian papers, please copy"!

The loss of his wife and two sons, and the absence of his third son, together with the marriage of his eldest daughter, Eliza (who had been his "right-hand man" on expeditions near home), affected Gould severely. One result was that he coddled the two remaining girls. They, indeed, were scarcely out of his sight until they approached middle-age. All three daughters lived to a fair age; the last (Sai) died rather more than ten years ago.

It was strange that Gould, with three sons and three daughters, all of whom reached adulthood, should have only one grandchild (she was the daughter of Eliza Gould, who became Mrs. Muskett and afterwards Mrs. Moon). Perhaps, however, the ghost of the old birdman is recompensed by the fact that both of his great-grandsons, like two of his own sons, are doctors, and, moreover, by the fact that artistic ability still obtains in the family.

So much for domestic history. To return now to 1838. I find from one of Mrs. Gould's letters to her mother that the party reached Hobart Town on September 19. It appears to have consisted of Gould and his wife, the young son Henry; a young nephew (Henry Coxen), John Gilbert (assistant to Gould), and a servant whose name is given only as James. "The country is very fine," Mrs. Gould wrote soon after arriving in Van Diemen's Land. "It teems with beautiful natural productions, both in the animal and vegetable kingdoms . . . and John is acquiring a vast fund of information." Tasmania attracted Gould so much that he stayed six months; then he went to New South Wales, where he penetrated as far as the Liverpool Range.

Returning to Hobart soon after the birth of Franklin, Gould then (in May, 1839) went to South Australia. He proposed later to visit Moreton Bay, New Zealand, and perhaps Port Essington (the site of a military settlement, near the present Darwin), but, after re-visiting N.S.W. in 1840, he decided to return to England, and so he left for London in April. Later again Gould talked of re-visiting Australia. He never did so, however; and so his personal contact with "New Holland" extended only from September of 1838 to April of 1840—little more than 18 months. But a very fruitful period it was!

Doubtless Gould's restriction of his personal associations with Australia were due to the competence of Gilbert. This man, who has left his mark on Australia more directly than Gould—his name is attached to a river, a range, many plants, some mammals, and a bird—was a young zoologist who came from Windsor. After working with Gould in Tasmania and the islands for nearly six months, he went to Western Australia and there collected and studied natural history for a year. He then returned to Sydney, from which point he went off to Port Essington for several months, and after that (in 1841) he returned to England. Early in 1842 Gould sent Gilbert to Australia again. This time he



John Gould.

worked in Western Australia, N.S.W., and Queensland, and in 1845, when travelling with the Leichhardt Expedition overland from Moreton Bay to Port Essington, he was killed by the blacks.

We have long lamented the lack of relics of Gilbert. Little was known of him and no letters or other documents of his were available in Australia. Imagine my pleasure, therefore, at coming upon a large batch of letters from Gilbert to Gould, and, more important, the diary kept by the murdered naturalist on his fatal expedition under Leichhardt!

As stated earlier, Gould's grand-daughter put me into touch with her son, Dr. G. Edelsten, and to him I went in a village in Hampshire. It was there that I obtained the first of a large series of interesting letters and also the historic diary; all had been reposing in a chest for years. Later, in a village in Somerset, I sat with Dr. A. Edelsten and examined many other letters to his great-grandfather. All—letters and diaries—are of value to Australia, and it is pleasing to report that the Drs. Edelsten have kindly agreed to allow them to go to an Australian library. Especially will the diary prove of interest. It contains notes on all phases of natural history, including many new species of plants, mammals, birds, and shells, and it sheds much light on the management of an expedition that was highly successful geographically, but lamentable in other aspects. The diary is in ink, but the writing is very small. It gave headaches to myself and a member of the staff of Australia House in the deciphering of several thousand words.

It has been impossible for me, with only limited time available, to cope with the whole of the material acquired. I have, however, written articles for *The Emu* (journal of the R.A.O.U.) in regard to the Gilbert and Grey letters, to which members of the Field Naturalists' Club may care to refer, and I attach here copies of some of the other letters. All of this material, I hope, will be of interest in respect of the Gould centenary. Certainly it is a happy circumstance that the documents, and in particular the historic diary, should have been discovered just 100 years after the arrival of Gould and Gilbert in Australia.

Feminine readers, one imagines, will be interested in Lady Franklin's bright chatter and her suggestion that little Franklin Gould should be made over to her. Doubtless they will be interested also in Mrs. Gould's pleasant motherly boasting to her friend, Mrs. Mitchell, of London. Sadly, though, the sweet-natured Mrs. Gould was to leave her children for ever a year or two later; the Franklin Gould was to die at sea at the age of 34; and the vivacious Lady Franklin was to have her life wrecked through her husband being lost in the Arctic.

From Lady Franklin:

My dear Mrs. Gould,

I hope you are settled in tolerable comfort at the cottage and feel yourself perfect mistress of it. I had a reply from Mr. Garrard which convinces me he would do everything in his power to promote Mr. Gould's researches.

As I find your servant goes up to New Norfolk to-morrow, I have desired my housekeeper to send you up some butter—I am sorry to find she has neither lamb nor pig to accompany it in time for the coach, so she proposes substituting some mutton, which it is to be hoped will be somewhat less tough than I understood was that she found in the cottage. I am told

the few remaining sheep there are not fit for killing. But you must absolutely give up housekeeping on Friday next and come to town for the Saturday's Regatta, which it is to be expected will be very brilliant. The Committee waited on Sir John to beg him to head the water procession in his barge and the schooner *Eliza* and the cutter *L'ausittart* be placed at the disposal of Capt. King to take such Govt. Officers and other persons of the most respectable class who may not have boats of their own. You and Mr. Gould and your little boy will, I hope, go in the schooner and join us on the ground and sit down with us in the pavilion to our luncheon. We shall, I think, be about 22 or about 30, including the children, for on an occasion like this the children must not be left behind. We hear that a great many booths and tents will be erected and the boatmen are to be regaled with bread and cheese and beer (perhaps with beef) from the different brewers in the town—but this is to be done standing.

In consequence of the extraordinary badness of the weather, Mr. Price has not gone to the town to-day, but put it off to the day after the regatta, Sunday, when he starts in his own boat and will still be happy in Mr. Gould's company if the latter likes to go. I should be almost disposed to recommend him thus to employ the very few days of interval which must occur between the regatta and our departure for Port Davey. Trusting to hear from you that we may rely on the pleasure of your company on Saturday, and with kind regards to Mr. Gould,

I remain,

Yours very truly,

JANE FRANKLIN.

Govt. House,
Monday Evening.

(This letter is addressed to, Mrs. Gould, Government Cottage.)

From Lady Franklin:

Govt. House,
Hobart,

July 15, 1841.

My dear Mrs. Gould,

I should have acknowledged long ago your kind little note of Sept. last. I believe all that I can say in excuse for myself is, that I have often thought of you and wished you back again. I fear you are too useful to your husband to be able to flatter myself with this hope, yet if he should leave you again for some distant part, such as Port Essington, Norfolk island, or New Zealand, or any place whither you would not accompany him, can you not again come over to us with the two boys and make this your home till your husband sends for you and fetches you away? Nothing, I assure you, would give me more sincere pleasure.

We have been much pleased to hear of your welfare by means of the short notes with which Mr. Gould has favoured Sir John, and, I believe, Mr. Gunn and Mr. Ewing. I almost envied you to hear of your living in tents on the Hunter. And what do you do next? Will Mr. Gould be going off to Norfolk Island with the *Maconachies*, or to New Zealand *without me*? How I should like to go with you there! You are the very people with whom I should like to go.

We have had the 2 French ships of Discovery here, *L'astrolable* and *la Zélée*. Capt. d'Urville, the Commander of the expedition, is a person of considerable science. They were very keen searchers after every thing that was curious and peculiar during their short stay. The chief artist of the expedition died here in the hospital on the day of their departure

and had a public funeral. A considerable number of invalids have been left behind and amongst these is one man shamming sickness in order to avoid going again amongst the ice. The person in question is a first class *cook* who seems to like our kitchen much better than his quarters on board the discovery ship and is now amusing himself with making love to my maid. How long we shall retain him I cannot tell, but in the meantime, tho' at a season when it is of the least importance, we are better off than we have ever been before. In all our respects my household is in a most disorganized state. My little housekeeper and her husband going away with the *Maconachies* to Norfolk island, the butler going away, the old cook gone, my own maid, after giving warning, only detained by the attractions of the Frenchman and the temporary enjoyment of promise of substitute for a housekeeper. What a relief it is to go to live in tents after all these domestic embarrassments! The approaching departure of Mr. Elliot detains us in town longer than usual. The loss will be almost irreparable to Sir John.

Mary Price has a noble little boy named John Frederick, remarkably large and strong and forward. It makes me often think of you and that sweet little Franklin, whom I think you ought to make over to me. I no sooner saw his sweet little face than he disappeared before my eyes, but I should consider your acquiescence in my proposal a sufficient compensation. Come, what say you to such an arrangement? Must the youngest be ever the one from whom you can least bear to part—they have all the privilege of having been youngest *once*.

Our little Natural History Society has its meetings in this house every Monday fortnight

(Note by A. H. C.: The remainder of this letter is missing.)

From John Gould, in the Tasmanian bush, to his wife in Hobart:

Georgetown,
Sunday 20th,
Jany., 1839.

My dear Eliza,

I am now in Capt. Friend's office and have only just time to write before the post leaves. We arrived here yesterday from Flinders, at which place I was especially gratified to strengthen my acquaintance with the natives on other things, and I should have left the Island with a light heart and proceeded to King's had [not] a fatal accident happened to one of the men, who shot himself dead by incautiously pulling the gun from the boat with the muzzle towards his chest. The cock of the gun caught the seat of the boat and all was over with the poor fellow in half a minute. I cannot tell you, my dear Eliza, how great a shock I sustained. I have scarcely been myself since, and I almost hate the sight of a gun. I have given up all idea now of going to King's and shall make my way across the Island as quickly as I can, making a call or two on the way. The inquest will be held in the morning, the man had every caution given him not a minute before to be careful with the gun, but his time was come, as his poor shipmates say, and with that they console themselves.

Pray give my kind remembrances to Sir John and Lady Franklin, to whose kindness we owe so much. Tell Lady Franklin I have her little page with me; he is a most interesting little fellow—throws the spear waddy with the utmost dexterity and is extremely useful to me in the bush; an

eye like a hawk, discovers birds' nests and eggs in a most astonishing manner.

Trusting you are quite well, I remain,

My Dear Eliza,

Yours affectionately,

J. GOULD.

(This letter was addressed to: Mrs. Gould, Government House,
Hobart town.)

From Mrs. Gould, in Hobart, to her friend, Mrs. Mitchell, in
London:

May 28th, 1839.

My dear Mrs. Mitchell,

Perceiving on a perusal of one of Mr. Prince's letters that you are all feeling apprehensive of our being in danger from the natives, I hasten to relieve you from that alarm. I have also participated in your fears during John's absence at Sydney, but as I now believe, quite needlessly. Indeed, he considers a prudent man more safe with many of the black tribes than without their protection. There are, however, some hostile tribes far in the interior, but I trust he has sufficient prudence not to venture within their district. The tribes which inhabit the upper Hunter and the adjacent parts of the colony are extremely harmless and well disposed. Two of them (the men, I mean) became quite fond of John during the short time he was with them and expressed much regret at his leaving, begging him to come again and bring his *gun*, meaning his wife, with him.

I expect to have many strange adventures to relate respecting Stephen's early residence in N.S.W. His has been an eventful life. When he first settled on the Dart Brook there were but few settlers within many miles, and you can form perhaps but an inadequate idea of the hardships and anxieties persons so situated must endure for three or four years or perhaps longer. Stephen, however, began with a determination to conquer every obstacle (so far as was permitted to human means) and he has succeeded in obtaining a fine tract of land, amounting in all to ten or twelve thousand acres, about as many thousand sheep, besides cattle, etc. But more of my brothers when I have seen them. Henry Coxen is with Stephen. John did not see Stephen's boys: they passed on the way, they going down the Hunter to Sydney after the holidays, and he going up towards the Dart Brook.

You, of course, know I am confined. John wrote 2 or 3 days after that event, and you may also perceive that you and my mother were very premature in your anticipations. And I must also tell you that this little Tasmanian is a prodigious fellow. Everyone says so, therefore it cannot be disputed. Several ladies with whom we have become acquainted here have lately thought proper to increase their families, but it is noted that in size none of their babies can compare with mine. I am not joking, indeed. . . .

I greatly fear my poor dear little Louisa suffered since I heard, as her eye teeth were not then through. How are the other dear children? Do they appear to retain any recollections of Papa and Mama? I often please myself with anticipations of our return, picture to yourself the joy and greetings when we meet. And I try to fancy the appearance of the dear children—they will be grown out of knowledge. I hope my dear mother continues well. I long to hear how she and you have passed the winter. I was truly glad to learn that Mr. Mitchell was well and in the prospect of remaining in his office. Will you request Mr. Prince to

forward the cowries to the Zoological? Pray present my kindest remembrances to Mr. Mitchell, Elizabeth, and all other friends. I am sorry to hear so poor an account of Mrs. Prince. Pray remember us also to Mr. and Mrs. Martin, and believe me, none of my distant friends are forgotten. I will thank my mother to forward the letter for Mrs. Gould as soon as possible.

I have flattered myself that among my numerous friends some would have found time to write. I hope you will give me credit for having done my part. Of course, I consider when I write frequently to you and my mother that my other friends hear also of our safety. . . . I shall never forget that it is my duty to write to Mrs. Gould, and a pleasure also.

May 30th.—The *Cheviot* not having yet sailed, I resume my pen to tell you we are, Baby and I, still going on well and getting more strength every day. . . . Mary has been my nurse and has proved a very clever one, too. . . . Henry sends love to Grandmama and brother and sisters. Believe me, my dear Mrs. Mitchell,

Yours sincerely,

E. GOULD.

(This letter was addressed to: Mrs. Mitchell, 20 Broad Street, Golden Square, London. Countersigned on outside John Franklin. Carries red seal.)

DISAPPEARANCE OF FRESHWATER POOLS

Naturalists who are interested chiefly in freshwater biology, especially microscopic forms, should look some years ahead in view of the possibility of some of the freshwater collecting localities disappearing. There is no movement in that direction at present, but I have in mind the loss of some localities, without prediction.

A good hunting ground and a favourite locality for *Utricularia dichotoma* was the Small Swamp at Cheltenham before its inclusion in the golf links area. It was the habitat of a splendid desmid, *Xanthidium gloriosum* (n. sp.) G. S. West. All that remained of it when I revisited in recent years was a muddy ditch, in which some dogs were delightedly splashing, and innocent of any visible vegetation.

Some years ago, when the course of the Yarra River was straightened, the basaltic quarry at Burnley was submerged. Previously, a little pool on the shaded side of the quarry floor provided the type of *Monastremmu expansa* G. S. West. (Fortunately, this species is in the Werribee River, where I first saw it a few years ago.) Another, and, like the latter, necessary destruction was that of a small but deep pool near Doncaster, because of children in the vicinity. In this pool I found a red Euglena, which I ventured to name *E. rubra*—a species ignored by some authorities but included with Ehrenberg's *E. sanguinea* separately by Zimmermann in Pascher's "Süsswasserflora. . . ." The filling in of this pool brought to an untimely end the further observations then in course.

It may be that, in the interest of biological science, certain fresh waters within easy reach of Melbourne for students should be preserved. It seems to me to be of sufficient importance to warrant resumption by the Crown of land on which these waters are situated, as in a process of land reclamation the swampy areas may disappear, and such an emergency as a raid on the mosquito might be also a raid on the pools.

A. D. HARMY.

THE BOTANY OF THE "BIRDS OF AUSTRALIA"

By EDWARD E. PEScott

It is interesting to note how all branches of natural history are so inter-related that one cannot be well considered without the other: as Longfellow says, "Useless each without the other." Thus it is that the important section of natural history—Botany—must be considered in relation to any and to all of the others. Insects feed on plants; birds feed on plant products; and animals also feed on plants. So that when insects, birds or animals are to be pictorially illustrated, they should be shown in their natural surroundings among the plants they feed on or visit. As well, there is the aesthetic side: the addition of plants and flowers adds very considerably to the pictorial value of the work; and it gives a far better idea of the life-histories, to show insects, birds or animals among the trees and plants they inhabit.

It was probably with these ideas in view that John Gould prepared all of his pictures; and so it is that in his works, and particularly in *The Birds of Australia*, that his immortal pictures are so natural and attractive. Gould was most fortunate in that his wife was also an excellent artist, and her collaboration with him helped him wonderfully in his work. Gould was accompanied on his visit to Australia by Mrs. Gould and their eldest son; and many, if not all, of the botanical studies in the great work were done by Mrs. Gould. Generally the pictures of flowers were painted separately; and they were later incorporated with the bird pictures.

In studying the pictures it is readily noted that some studies were used over and over again. Thus the Yellow-tufted Honey-eater and the Graceful Prilotis are seen among sprays of *Pittosporum phyllarabides*, the fruits being seen to far better advantage in the latter than in the former. *Castuarina* is frequently seen in the pictures, only occasionally with the flowers and rarely with fruits. The White-shouldered *Campephaga*, the Shining Flycatcher and the Singing Honeyeater are shown among the Shenak branchlets.

The Red-throated *Pachycephala* is shown on the Curralong tree, with large pods of a rich purplish brown, too bright to be true or correct. These pods reappear in various tones and shades, but the flowers are always perfect. The picture of the Crested *Oreocera* is also very fine with the Curralong pods.

Tecoma Australis, the Wonga vine, appears in many pictures, not only in its normal cream and purple tones, but, as in the case of the Broad-billed Flycatcher, in the cream-coloured variety as well. The illustrations of the common Heath, *Epacris impressa*, are not particularly good, the flower spikes being rather thin. The white variety is seen with the Slender-billed Spine-bill, and the pink form with the Tasmanian Honeyeater. One orchid

appears; this is apparently a *Habernaria* (in vol. 4), and is associated with the Rainbow Pitta. Some of the most decorative pictures are seen where the birds are shown perched among flowering sprays of *Loranthus linifolius*. The colour is rather pink than red, but that is unimportant. The picture of the Swallow *Dicaeum* so depicted is a real gem; and no doubt Mrs. Gould was responsible for this.

Leptospermums, *Grevilleas*, *Melaleucas* frequently appear; so do *Eucalypts* and *Acacias*. It is not easy definitely to fix the species of many of these plants, as Mrs. Gould has generally used her artistic sense rather than botanical accuracy in her paintings, especially of the foliage. After all, they are bird pictures: all else is quite secondary.

One slip is noticed: where Gould says in the text that the Striated Pardalote "gives a decided preference to the *Eucalypti*," yet the bird is illustrated on the Currajong sprays.

Banksias are frequently seen. Gould says, speaking of the Bush Wattle-bird, "The *Banksias* are in blossom during a great portion of the year, and each flower as it expands is diligently examined by the Wattle-bird." The picture is of the *Banksia serrata*, and was probably painted in Adelaide.

John Gould was very fortunate and happy in his marriage; and in that way was, no doubt, the envy of some of his friends. Edward Lear, a close friend—he who wrote *The Book of Nonsense*, and who also drew and engraved some of the plates for Gould's birds—wrote to Gould in 1841: "I wish to goodness I could get a wife Please make a memorandum of any lady under 28 who has a little money and who knows how to cut pencils and make puddings; . . . the wish of my life at present is quiet, to live in the country and paint landscapes—the cutting-pencil, pudding-making lady included." Charles Lear no doubt knew Mrs. Gould and her ability.

Of his wife and her work Gould gave great praise. She lithographed nearly the whole of the plates of the *Birds of Europe*: and she prepared all of the botanical backgrounds for the *Birds of Australia*, as well as some of the ornithological work. Mrs. Gould died about a year after their return from Australia.

A series of the original botanical drawings of Australian plants, flowers, and foliage, specially painted by Mrs. Gould for the ground-work of the *Birds of Australia* is on sale in England at the present time. One, depicting the growth and fruits of *Billartiera longiflora*, is particularly beautiful.

The coloured plate of the Buff-sided Scrub Robin, *Drymodes superciliosus*, which is reproduced in this issue of the *Naturalist*, is taken from Gould's *Birds of Australia*. It by no means represents the best of the plates but only the best that was available for reproduction.

NOTES ON HIBERNATION, ECDYSIS, AND SENSE OF
SMELL OF THE ECHIDNA UNDER DOMESTICATION

By EDITH COLEMAN

Accounts have been given in previous issues of *The Naturalist* of the hibernation of my three Echidnas. This year "Prickles," an adult female, hibernated for only 29 days—one period of five days, and two periods of 12 days each.

It is interesting to compare the hibernating periods for her four years of captivity:

1935	6 days
1936	117 "
1937	44 "
1938	29 "

When her six-day period occurred, Prickles was apparently only about eight months old. Another female Echidna, "Stickles," of about the same age, or a little older, hibernated for only one six-day period in 1934, and for one six-day period only in 1935 (*V.N.* August, 1935). She died in November of the same year. The behaviour in captivity of one animal, even for four successive years, cannot safely be accepted as typical of what occurs in natural circumstances.

From Prickles' records one might anticipate that her periods of hibernation will decrease in length, and finally cease to take place in captivity.

The records of my three Echidnas have shown that hibernation varies very considerably, both as to time of the year and in length of period. It is probably only a partial hibernation, unlike that of true hibernators which go, like Caesar's troops, into winter quarters, and stay there until the cold weather has gone.

It is generally believed that hibernation is a deep sleep, induced by continuous cold; but my Echidnas were often active on the coldest days of the year. In 1935 Stickles emerged from her hibernation on the coldest day in June.

This year Prickles was active during the severely cold days of July. On July 11th she was foraging at 8.45 a.m., while the ground in her run was covered with frost. She was about even earlier on July 12th (another icy day), and on the 17th and 18th, both extremely cold days.

An examination of Stickles on the third day of hibernation (*V.N.*, August, 1935) showed her to be in a state of torpor, a condition very different from sleep, as we might know it—a nightly-recurring quiescence after the day's activities.

Her condition certainly suggested true hibernation, "a definite imperfection in the warm-bloodedness of the animal, a lapse towards reptilehood, with very remarkable constitutional changes in heart and blood, in breathing and excretion." (Thomson.)

Echidnas certainly dislike wet weather, and do not emerge from shelter during even light rain.



"Prickly" showing transformation wrought by new air and spines.

It was very wet, as well as cold, during Prickles' August, 1938, hibernation. It is probable that the condition is induced as much by prolonged wet weather as by low temperature.

In normal circumstances scarcity of food would doubtless be an important factor. Hibernation, in lean periods, would be a safety measure, for "he who sleeps, dines." It is certainly significant that Prickles' reappearance this year coincided with the opening of the first Crocus, on a warm day which made us think that, after a hard winter, spring was really here.

It was a false promise, however, for winter was with us again next day, and on many following days; but Prickles did not hibernate further. According to a note in a Melbourne newspaper, a Frankston (Vic.) resident came across an Echidna on June 26th of this year. He had never seen Echidnas abroad before the end of September, and assumed that this animal had not hibernated. But this was by no means an unusual date for the Echidna to be active, either in a wild state or under domestication.

ECDYSSIS

An account was given (V.N., Dec., 1935) of the ecdysis of two Echidnas, the process, although gradual and fragmentary, being very thorough.

With each of my Echidnas it has taken place in the same manner, the process being so gradual that at no period is the animal's body entirely bare of hair or spines. Some of the old spines are not shed until many weeks after the new hair appears.

As in the case of other mammals, the Echidna becomes very shabby during ecdysis, the new "fur" and spines bringing about a transformation in its appearance before and after shedding her coat.

As the process has not varied with the five Echidnas I have had under close observation, I think we may assume that, in normal circumstances, ecdysis is very gradual, and takes place yearly.

SENSE OF SMELL

The most striking habit exhibited by all of my Echidnas has been their consistent protection of the snout when basking in very warm sunshine. The snout is pushed into the soil, or is buried under a light layer of humus, according to the warmth of the sun—a habit which stresses the importance of keeping the mucous membrane moist, in a creature whose existence in a natural state probably depends upon a keen sense of smell. Although Prickles sleeps beneath several feet of humus, she appears at once when food is placed in her enclosure—even though it may be placed at a distance of 4 or 5 feet from where she lies.

Except when hibernating, she appears to be aware instantly of its presence, even on a windless day, which points to the possession of a very acute sense of smell.

THE ORCHIDS OF ORBOST DISTRICT

By FRANK ROBBINS, M.S.C.

See p. 129.

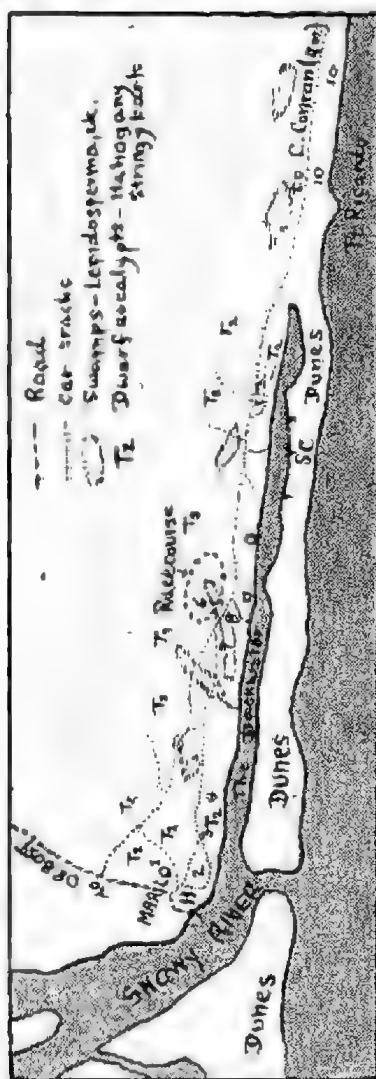
During 1935-6-7 I spent many pleasant days exploring eastern Victoria, particularly the area around Orbost, Bete Bolong, Jarrahmond, and Brodribb (known as the Snowy River Flats), and Marlo, which is at the mouth of the Snowy. A glance at the map will show the position of the places mentioned. The Snowy River Flats represent a huge inlet or lake, which, by frequent flooding, has filled up completely, except for the Lake Curlip (on Brodribb River), Lake Watt Watt, Lake Coringle, and The Backwater (a dune lake). Needless to say, these flats are among the richest in Victoria, and are used for growing maize, beans and peas, and for dairying.

Above Bete Bolong and Jarrahmond, the Snowy emerges suddenly from rugged country into the Flats, and the tributaries here abound in jungle flora. *Cleisostoma tridentatum* (Tangle Orchid) is very common in Pipeclay and Wibenduck Creeks, which are easily accessible by car. It also occurs, though not so profusely, at Glen Arte Falls (few plants), and in the Mt. Drummer jungles (fairly common), and I should say that it is probably far more widespread than indicated above. Many years ago it was found at the Young's Creek Falls near the Princes Highway, but was never reported. Since then, the falls have been cleared and the orchid destroyed. Very similar in appearance, *Sarcophilus parviflorus* (Small sarcophilus) is also found, in small quantities only, in Pipeclay Creek and adjacent gullies, at Mt. Buck, at Thurra River, and along the eastern bank of the Boggy Creek (Nowa Nowa). This orchid is widespread in East Gippsland. The popular *Sarcophilus falcatus* (Snowy Sarcophilus), but known locally as the Cann River Orchid, still exists at Cann River, but is doomed to extinction owing to clearing on the settled area. *Dendrobium striolatum* (Streaked Rock Orchid) is very common on the rocks at Boggy Creek for a mile or so above the Nowa bridge, and I have seen it also at the Genoa Falls beside the Princes Highway, and on the road to Errinundra. *Dendrobium speciosum* (Rock Orchid), but known locally as Rock Lily, is known only at Stony Creek (beyond Genoa). It is on private property, and very little is left. It is also reported from inaccessible places in the Upper Cann valley, and is common on the Nungatta Mountains, just over the border.

It is possible that further epiphytes or lithophytes will be found in the unexplored regions of East Gippsland. I have it on good authority that a very extensive unexplored jungle exists on the Roger and Yalmy Rivers some 30 miles above Orbost, but I did not have the good fortune to search there. It may be worth mentioning that a plant of *Cleisostoma tridentatum* has been trans-

planted to Kowar (Upper Cann valley), near Mr. G. Thompson's famous tall Clematis.

By far the best orchid hunting ground is to be found at Marlo on the east of the mouth of the Snowy River, behind The Back-



Map of Marlo District.

water. At least 55 species have been recorded from here, and the immediate environs of the Snowy Flats, while my total for East Gippsland was about 60. It was here that I found *Cryptostylis erecta* (Banner Orchid), two patches only, having been found to date, both in conjunction with *C. subulata* (Large Tongue Orchid). Though I had literally gone over this ground dozens of times, it remained for Mr. W. Hunter to discover here another *Cryptostylis* new to science, *C. Hunteriana* (Furred-Tongue Orchid), described in the March issue. Possibly the 1937 season favoured its appearance, as two other local orchid enthusiasts simultaneously found specimens without realizing that they had something new. Perhaps this should encourage more of our younger enthusiasts to get their species named. Mr. Wakefield also found this new orchid 15 miles further east near C. Couran, and, as at Marlo, it was in conjunction with *C. subulata*, which is common in the wetter parts of the Marlo and Couran Plains. In fact, all three of the above Tongue Orchids grew together

a few yards off the racecourse track. The fourth Tongue Orchid, *C. leptochila* (small Tongue Orchid) also grows here and near Orbst, but I did not chance to find it.

Dinris punctata (Purple Dinris) grew wonderfully near the racecourse in 1937-8, though rare in other seasons. *Glossodia minor* (Small Waxlip Orchid) was found in 1935 at Newton's

Creek, Reedy Creek, and Mt. Raymond; and was also very common near the Marlo racecourse, yet I did not find a single specimen here in the dry 1937 season. A nice patch of *Calceana minor* (small Duck Orchid) occurs along the track about a quarter of a mile from the Marlo Hotel, curiously enough only on the sunny sandy side. The new scenic road being made here will probably destroy these dainty little orchids with their narrow purple leaves, which subtend flowers about Nov. 15th. *C. major* (Large Duck Orchid) also occurs here rarely.

On the more open spaces near the racecourse, the following species dominate: *Prasophyllum brevifolium* (common), *P. elatum* (sometimes a deep smoky colour), *Microtis uniflora*, *Caladenia carnea* (also variety *pygmaea*), *C. dilatata*, *C. Patersonii* (pale yellow form), *Diuris longifolia*, *Thelymima ixionides*, *T. flexuosa*, *T. Elizabethae* (possibly *carnea*), *Orthoceras strictum* (rare), *Lyperanthus suaveolens*, and two other *Prasophyllums* not yet identified.

On the higher and more sandy bracken country here, the following species dominate: *Pterostylis nana* (very common), *P. purpuriflora* (common in autumn), *Caladenia coriophila* (Fleshy-lip *Caladenia*), *Lyperanthus nigricans* (one large patch had flower spikes on every plant in 1936, but none in 1937), and *Pterostylis barbata* (rare).

Hiding in the sandy bracken scrub nearer the hotel are to be found: *Corycanthes fimbriata* (Fringed Helmet Orchid—very common), *C. dilatata* (Stately Helmet Orchid—very rare), *C. acutiflorus* (Spurred Helmet Orchid—very rare), *C. unguiculata* (small Helmet Orchid—rare, and also found in the forest near Mt. Buck), *Acanthus reniformis*, *A. exsertus*, and *A. caudatus* (all common, the last always flowering later after the other two have died), *Pterostylis nutans* (common), and *P. longifolia*. Here also *Chiloglottis reifera* (Autumn Bird-Orchid) literally covers the ground, yet seldom is ever a flower seen in that season. Good patches of it are also found at Jarrahmond. In early winter, another common feature of the Marlo bracken is the beautiful *Pterostylis grandiflora* (Long Tongue Greenhood), *Caladenia latifolia* (Pink Fairies) was found on the Marlo cliffs, I did not find *Pterostylis concinna* (Trim Greenhood) anywhere in East Gippsland.

Leaving Marlo, the following species may be found on the grassed hilly fringes of the Flats. *Pterostylis acuminata* (Pointed Greenhood—often mistaken for *P. nutans*, which hangs its head), and *P. falcata* (Sickle Greenhood—common). Where the forest still remains are found: *P. curta* (Blunt Greenhood—rare), *P. pedunculata* (Maroon-hood), *Diuris maculata* (Leopard Orchid), *D. sulphurea* (Tiger Orchid), *Chiloglottis Gummii* (Common Bird-orchid), *Caladenia angustata* (Musky *Caladenia*), *C.*

praeox (Early *Caladenia*—found in 1935 at Mt. Raymond and Mt. Buck road), *C. Menziesii* (Hare Orchid), *Eriochilus cucullatus* (Parson's Bands), *Calochilus cupreus* (Copper Beards), and *C. Robertsonii* (Brown Beards). In summer, the beautiful Hyacinth Orchid (*Dipodium punctatum*) is common anywhere along the Princes Highway.

The H.E.S. ground abounds in *Microtis uniflora* and *Thelymitra pauciflora* (Slender Sun-orchid). The latter is noted for its flowers seldom opening, but on several occasions I saw the hillside blue with its flowers. The hot, moist air and bright sunlight cause this, yet they would all close up in a few minutes if a cool sea-breeze sprang up from Marlo.

The above list is probably far from complete, but I may add that *Caladenia coerulea* (Blue *Caladenia*) is common at Cann River, and I found *Pterostylis cynucephala* (Swan Greenhood) at Little River, in the Upper Snowy valley.

KEY TO MARLO MAP

- V.—Salt swamps—*Juncus vaginatus*, *Triglochin striata*. II—Hotel Marlo.
1, 2, 3.—Best for undergrowth orchids. 4, 5, 6, 7, 8.—Best for open heath land orchids.
1, 2, 3.—Best for undergrowth orchids.
4, 5, 6, 7, 8.—Best for open heath land orchids.
1—*Pterostylis grandiflora*, *Chiloglottis reflexa*, *Corysanthes fimbriata* (abundant).
2—*Corysanthes unguiculata*, *aconitiflorus*, *fimbriata*, *dilatata*.
3—*Calceana minor*.
4—Numerous species—*Caladenia cardiophylla*, *Acianthus cuneatus*, *Pterostylis nana* and *P. barbata*, etc.
5—*Cryptostylis erecta* and *subulata*, *Xanthorrhoea hastilis*.
6—*Cryptostylis Hunteriana*, *erecta*, *subulata* on racecourse.
7—*C. Hunteriana* and *subulata*, *Glossodia minor*, *Dieris punctata* *Prasophyllum brevifolium*, *Caladenias*, etc.
8—Red *Correa*, heaths, etc.
9—*Leptospermum laevigatum* scrubs.
10.—Open heath sands.
SC.—*Scorciola calendulacea*.

A GLIMPSE OF AN ARCTIC ISLAND

By EVELYN M. LYLE

My chief object in visiting Heinasari Island, which lies about 350 miles north of the Arctic Circle, was to observe the sea-birds which were said to nest in great numbers there. The island, during nesting time, is guarded and patrolled as a bird sanctuary by Finnish authorities.

We set out from Petsamovuono (Petsamo Fjord), where ends the Great Arctic Highway, in the little coastal steamer *Jaameri* (Jaa = ice, and meri = sea), sailing north on the calm waters of the Arctic Ocean. The waters of this fjord are never ice-bound in winter, owing to the warming influence of the waters

of the Gulf Stream as it flows along the coast of Norway and on.

During the entire voyage hundreds of sea-birds flew around us, industriously fishing in the ocean, which teemed with fish, so we were told. There were many species—Riskila (*Cephus grylle*), Razorbill (*Alca torda*), Guillemot (*Uria lomvia*), Puffin (*Prosercula arctica*), Eider Duck (*Somateria mollissima*), and about half a dozen kinds of gulls. As we neared the islands the air resounded with their cries. Most of the species were the same as I had seen nesting on the cliffs of Lundy Island, England, in May, and we discovered that nesting time here, too, was over, as there were some well-grown chicks swimming with their parents.

Our first real glimpse of the larger island was rather surprising. Instead of a rocky, desolate island, as we had imagined it, we saw a mass of vivid colour, which we identified on closer inspection. It appeared, as viewed from the water, in bands—the rich green of the lady fern (*Athyrium filix-femina*), the beautiful orchid-mauve of the Hørsma (*Chamaenerium angustifolium*), and the deeper green of the cloudberry leaves (*Rubus chamaemorus*) topping them all, for the entire cap of the island was covered with these berries, with their luscious orange-yellow ripe fruit.

Botanizing in Lapland certainly had its fascination, one came across such unusual combinations. Working from a Finnish botany book and with Finnish friends, I classified all my specimens, and used the Finnish vernacular names from force of habit. On my return to England I discovered, to my amazement, that many of the plants were similar there, and I did not even know their English names. Even to this day I use the Finnish name "Hørsma" for that beautiful wayside plant—which looks its best against a background of silver birches—instead of the very cumbersome English one—Rose Bay Willow Herb.

The association of species on the island was very interesting. Round as a fringe just above the beach were different members of the Compositae order growing very profusely, as can be seen from the photo. Among the plants were the small but deep burrows used for nesting purposes by the quaint puffs which were just commencing to lose their gay courting colours from their beaks.

It seems that "Heinasaari" means "hay," and the island is so named because of its plentiful growth of natural hay (*Agropyrum repens*). This was seen in great heaps when we found an encampment of Lapp families who make an annual summer visit to the island to cut and take away the hay to their homes on the mainland. They also add to their stores, and probably to their incomes, too, by gathering the cloudberry. We saw many barrels full of the fruit ready for loading into the boats.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, October 10, 1938. The President, Mr. R. H. Croll, presided, and about 100 members and friends attended.

OBITUARY

The President referred to the recent passing of Mrs. Gabriel, senior, and Mr. Tom Tregellas, and members stood in silence as a mark of respect.

SUBJECT FOR THE EVENING

The President, in introducing the subject, referred to the centenary of John Gould's visit to Australia, and spoke of some lesser-known incidents in Gould's life. He also referred to the interesting material obtained in England by the Past President, Mr. A. H. Chisholm, C.F.A.O.V., some of which is published in this issue of the *Naturalist*. Mr. R. T. Littlejohns then gave an illustrated lecture on "Lyre-birds and Other Forest Dwellers." A series of unique flashlight photographs, together with a running commentary, gave to members present an interesting and enjoyable evening.

CORRESPONDENCE

From the Shell Co. of Australia, thanking the ladies for their help in assisting with its exhibit at the Wild Nature Show.

From the A.N.Z.A.A.S., re delegates' names given for the Canberra Congress.

From Miss Alice Henry, enclosing coloured reproductions of American Wild Flowers.

REPORTS OF EXCURSIONS

Excursions were reported on as follow: Mornington, Mr. Ivo Hammet for the Misses Knox; Club Picnic, Mr. R. H. Croll; Taradale, Mr. Ivo Hammet. A preliminary report on the Wild Nature Show was made by the Show Secretary, Mr. A. D. Hardy, the President expressing the thanks of the Club to Mr. Hardy for his efforts to make the Show a success.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as ordinary members: Mr. Cedric Ralph and Mr. John Lappitt; and as associate, Miss Sylvia Duncan.

GENERAL BUSINESS

Baron Von Mueller's Memorial: The Secretary outlined the reason for the Club's action in this matter, and invited members to contribute to the fund.

NATURE NOTES

Mr. A. D. Hardy showed some very interesting New Zealand natural history photographs.

Mr. F. S. Colliver showed some photographs of very early Club excursions, the earliest being those of a camp-out at Maroon-dah Weir on November 9, 1900, these by the courtesy of Mr. J. A. Kershaw, C.M.Z.S.

EXHIBITS

Mr. R. H. Croll.—Aboriginal implements from Central Australia.

Mr. C. French.—Garden-grown flowers of *Olearia* (*Aster*) *teretifolia*, F. v. M. Slender Daisy Bush from near Anglesea, and Onion Grass (*Romulea bulbocodium*), with yellow flowers, collected at Balwyn.

Mr. F. S. Colliver.—A series of Cambrian Trilobites from America.

HOODED ROBIN NESTING IN IMMATURE PLUMAGE.

Over 40 years ago Mr. Robert Hall, in the course of a paper read before the Club, on the plumage of Robins, stated, on the authority of a Wimmera correspondent, Mr. J. A. Hill, that the "Hooded Robin breeds before signs of maturity appear." A few years later A. J. Campbell published his *Nests and Eggs*, and although he referred to Hall's "valuable note" on the Hooded Robin, it is significant that he neither added to, nor detracted from the information.

Last Spring, on the Mornington Peninsula, we found a nest of the Hooded Robin, *Melanodryas cucullata*, containing three young, both parents being in immature plumage. Later, the nest was exhibited at the Club. An inquiry amongst birdmen with wide held experience brought to light the interesting fact that, although it is well known that other Robins breed before attaining adult plumage, no one had actually found two of the Hooded species nesting in juvenile dress. Usually one is a mature bird. Some of the oologists expressed a doubt as to the fertility of the eggs in the event of both birds being immature.

Knowing that many birds are very local in selecting nesting sites, we made a point of visiting the spot this season to see whether the same pair were again building. Unfortunately, the area had been devastated by fire, and it was not possible to guess which of the pairs on the opposite side of the road were the ones we had under observation last year.

BLANCHIE E. MILLER.

IN THE LAND OF PINE AND BELAR

By L. G. CHANDLER

Tucked away between a dense belt of mallee scrub and the Murray River, in the north-west of Victoria, lie a chain of lakes with a beauty that would be difficult to surpass. In the spring the loveliness of the lakes, hedged in, as they are, by magnificent Red-gum trees, is enhanced by the sloping sandhills, emerald-green with grass and gay with wildflowers. Thousands of waterfowl disport themselves in the water—the lakes are a sanctuary for game—and a large variety of interesting birds are found in the surrounding Box-gum flats and mallee scrub.

Where are the lakes, and what are their names? Visitors traveling by car along the Calder Highway to Mildura little dream that between Hattah and Nowingie, and, a few miles in behind that thick wall of scrub, lie these gems of lake-land. Beginning with a series of lakes side by side, Lakes Konardin, Yetwell, Mournpool and Yerang, and so southward through flood-flats to Lakes Lockie and Hattah, and, flowing eastward to Lakes Little Hattah and Brockie, and smaller lakes. Farther north is Lake Bitterang, and east from there Lake Cantala.

Interspersed over the area are smaller lakes that are often dry. At the time of writing a number of the lakes are dry, and the water is rapidly evaporating from others. The building of flood-gates at a suitable spot in Chalka Creek, as advocated by the Mildura Shire Council, would ensure that the whole chain of lakes, and the creek itself following a flood in the Murray River, would be filled with permanent water. The last big flood occurred about 1930, and miles of flood-country were under water. At one spot the waters crossed the Calder Highway, at a point between Hattah and Nowingie. The damming back of the water would have to be similar to natural flood conditions, to preserve the timber. This seems a necessity, for the lakes and backwaters must be the spawning-ground for enormous numbers of fish. When the lakes dry, tons of fish unable to escape are destroyed.

Although beautiful at any season of the year, the best time to visit the lake country is during September and early October. The Mallee scrub along the Calder Highway is then seen to perfection. To those who imagine that the Mallee is a land of dreary deserts, the strip of virgin country between Hattah and Nowingie should convince them that the north-west of our State has a beauty all its own.

Wild flowers are everywhere, and rivalling the tones in an old-world autumn wood, are the exquisite colours in the young tips and buds of the dwarf Mallee Gums. An artist would love this riot of colour, and the soft, pastel shades in the boles of the trees.

Among Tea-tree, with starry white blossom, are dwarf Casuarinas, that at one period of the year hang out long golden and



Scene on Lake Little Pattah



"Glorious Red-gums form Nature's Cathedrals."

Photos. by L. G. Chandler.

copper streamers, which resemble a fireworks display. Blue and mauve Daisies attract attention here and there, and small Wattles, with fluffy balls of gleaming gold, fill the air with perfume. Dozens of smaller shrubs and creeping plants add yellow and blue and pink, red and white to the colour scheme, and the motorist needs to idle along, and stop and admire, if he would absorb the loveliness of it all.

When the lakes and flood-country are reached, the change in the scenery is startling. Leaving the Calder Highway near Hattah, and driving along a sandy track through Whip-stick Mallee Gums and Porcupine Grass, one suddenly emerges on to grassy slopes in places thick with Ham and Egg Daisies and other flowers, and Lake Hattah, surrounded by beautiful Red Gums, lies at one's feet. Lakes Little Hattah and Brockie, and others unseen, are to the eastward, with miles of grey, Box Gum flats and red sand ridges, with typical Mallee vegetation, between and beyond.

If the connecting channels are dry, one can turn northwards, and, following the fringe of the lakes and flood-country at the foot of the sandhills, travel from one lake to another through delightful scenery. Graceful, Eumong Acacias make attractive pictures in the small lignum swamps, and the beauty of the Red Gums in contrast to the sombre Box Gums is a source of endless delight.

In the spring the red sand ridges that fringe the grey soil of the lake country may be described as natural park land. Green with grass, and bright with wild flowers, and here and there specimens of Murray Pine, Belar, Cabbage-tree, Tea-tree, Pittosporum, Needle-bush, etc.

Truly a lovely spot, and, as an added attraction, the area is rich in bird-life peculiar to the Mallee. The Mallee scrub here is one of the few remaining strongholds of the Mallee-fowl, and other rare birds, and the species is disappearing rapidly. The gun and fox take their toll of this fine bird, and only a game warden can hope to stop the depredations of "sports."

Practically every form of what one may call typical Mallee birds is found within this area. Grass Wrens, Hylacola, Scrub Robin, three species of Maluri, Black-winged Currawong, Bell-bird, Thornbills, and numerous species of Honeyeaters and Parrots, to mention a few. I was delighted one day to hear the "charr-r-tuk-er-tuk-er-tuk" of a Scrub Robin, and its pretty, drawn-out whistle. I had not seen the bird for twenty-six years, and it is one of the most charming birds of the scrubs.

As previously mentioned, the lakes and flood-flat country are teeming with birds, and in flood time this corner of the State must be one of the best breeding-grounds for water birds. Of the rarer species, a few Spotted Bower Birds still survive, and White-bellied Sea-eagles have been seen around the lakes.

For the sake of future generations of Australians, this area should be preserved for all time as a National Park. It is one of



Graceful Eumong acacias in the lignum swamps.

Photo. by L. G. Chandler.

the few beauty spots left in the north-west, and, if the lakes and irrigation settlements are to be protected from sand drift, the surrounding Mallee scrub, to the Mildura-Melbourne railway line, must be included and left intact. Already there is a definite danger spot on Lake Lockie. This is a shallow lake, and, once filled at any section with drift sand, most of the flood-waters would be cut off from the Hattah series of lakes, and the whole face of the country changed.

To the east the Kulkyn Forest Reserve is flanked by the Murray River—the life-blood of the irrigation settlements. In spots in the bends of the river the glorious Red Gum trees form Nature's cathedrals, the rarely-absent sunlight filtering through the leaves with a soft radiance as from stained-glass windows.

FURTHER NOTES ON THE MOUNTAIN GRASSHOPPER, *ACRIDOPEZA RETICULATA* GUERIN

By EDITH COLEMAN

The following notes, supplementary to those already published (*Victorian Naturalist*, June, 1938), complete the life story of an interesting member of the *Orthoptera*.

In past seasons, the eggs deposited in my cages have proved infertile.

In February and March of this year, male and female nymphs and adults were enclosed in a child's play-pen, 5 ft. by 5 ft. by 3 ft. The pen was completely covered with butter-muslin, the roof arranged to allow me to feed and examine the Grasshoppers. In this cage many nymphs completed their metamorphosis.

Thistle, Lettuce, Sweet-corn and other leaves were eaten, but Ragwort (*Senecio*) was preferred. Soon some hundreds of eggs were attached by their viscid covering to the muslin roof and upper part of the cage walls (see photo. on page 120). The Grasshoppers had been brought from a sheltered locality, where dense forests of Tea-tree and other brush would temper the asperities of winter.

As my pen was on a lawn, fully exposed, the roof was covered with sacks. These were removed on sunny days during the winter, and dried to prevent mildew.

The first larva, a female, appeared on September 4. She was so small (3 mm. in length) that, in such a large cage, others which emerged earlier may have been overlooked.

Within a few days I counted 40 larvae, males as well as females, their number increasing until, at the present time, there are probably several hundred of the ant-like creatures in the cage. The body, legs and antennae of the newly-emerged larva are red, the lines of blue dots on each abdominal segment clearly defined, and on the forehead a series of blue "hieroglyphics" make a definite pattern. The black spherical eyes are large and prominent.

The orange collar and abdominal bands, in the female, are just

visible. The appendages at the end of the abdomen are bright orange in both sexes. The first skin is shed on emergence. In a few hours, as is usual after ecdysis, the colour darkened, becoming almost black, the blue dots only visible in a bright light, with the aid of a lens.

In the females the orange colour became more definite, until, when the larvae were almost black, it was startlingly bright in contrast. White bands were strongly marked on the translucent antennae, which, like those of the adult, were in ceaseless motion.



Eggs of Mountain Grasshopper (about natural size).

These bands are clearly shown in the photograph of a female larva on page 121. As the tiny creatures crowd together in a sunny patch, they form a seething mass of waving antennae.

The males are distinguished by the smaller abdomen, rather longer legs and antennae, and the absence of orange bands, the orange collar only showing clearly when the head is moved. It is interesting to note that the blue dotted lines are present all through life, but at certain periods they are not seen through the almost black skin, unless the insect is illuminated.

Opening an unhatched egg, the red larva is seen to be a perfect little Grasshopper, like the parents, except that there are no wing-buds. Spreading out the limbs, one is amazed to find so large a body packed into so small a compass. On the red body the lines of blue dots are beautifully clear, and on the legs four or five large white spots stand out against the red. The abdominal appendages

are bright yellow. The black eyes, like those of the embryos of many other creatures, are startlingly large.

Externally, the buff-coloured eggs are perfect examples of protective coloration. When one notes the polished exterior, and the brown, enamel-like inner surface, one realizes how well adapted are the eggs to safeguard potential larvae during rains and lowered temperatures of winter.



Photo. by O. H. Coulson.

Female larva, 42 days old
(enlarged).

As the larva emerges the egg opens, like valves of a mussel shell, closing again when the larva is free. Its shed skin, like a tiny cream-coloured shroud, is left attached to the outside of the shell. As I find many of these little cast coats, it is evident that they are not eaten, or not always eaten, on emergence, as are those which are shed later on.

It was not long before the larvae made visible inroads on tender leaves of Lettuce and

Ragwort. The latter was always preferred.

They are growing apace. At the present time (September 21) some of the females are 8 mm. in length, and proportionately stout.

Like their parents, they feed only in early morning and late afternoon. There is no night movement. They sleep head downward, scarcely moving even when touched; but, when feeding during the daytime, they are extremely active, dropping, beetle-like, to the ground if disturbed, and are soon out of sight in the grass.

There does not appear to be such a great disproportion in the sexes as one might expect from the smaller number of adult males one sees, but it is early yet to make a statement on this point, as others are still emerging. In normal circumstances, birds, parasites and various mischances would probably take heavy toll. Even in the comfort provided for them, many larvae die, and there are certainly more deaths among males than females.

Beyond the skin which is shed on emergence, none appears to have been shed until October 12.

As I had enclosed a number of larvae in a glass cage, where I could watch them in the house, I do not think I should have missed this had it occurred.

On October 12, at 2.15 p.m., I found a female larva suspended, head downward, from her shed skin. Her almost translucent body, legs and antennae were amber-red in colour. Orange bands showed clearly, and the blue dots were well defined. At 2.30 p.m. she had changed her position, and was suspended with head upward. Her colour had darkened considerably. At 3.10 p.m. she commenced to eat the exuvia. She walked away at 3.30 p.m., leaving only portions of the legs. Her body was then almost black, except for the vivid orange collar and wide, orange, abdominal band. When illuminated, the dotted blue lines were obscurely seen. She was 5 mm. in length. When touched, she became very active, dropping at once to the ground.

This habit is general. It is remarkable how quickly the larvae disappear after dropping to the grass. It probably explains why their activities have not hitherto been described.

So far, I think, we must say that the Mountain Grasshopper is extremely useful, for it shows a decided preference for the plant pest, *Senecio*. Yet, at Sorrento, it is killed on sight by gardeners, who tell me that they find it on their beans. (In captivity they refuse the leaves of beans.)

Although I have myself seen many adults in a large Sorrento garden, I could find no trace of inroads on any plants. As these were nearly all females, it is probable that they had left their food plants in search of suitable situations for oviposition.

I think there is little doubt that, in the absence of Ragwort, the Mountain Grasshopper would adapt itself to other forms of vegetation. As Ragwort is not available in my garden, I have set seeds in the cage of many herbs which I know, to my sorrow, are irresistible to birds and slugs, such as the Sages (Red-top, Broad-leaf, Clary, etc), Rocket, Sweet Basil, Cress, Lettuce, Tarragon, Chervil, Rue, Scurvy-grass, and many other hardy species. Although these are already in leaf, I can see no proof that the Grasshoppers have tried them, but I have no doubt that they will do so when they are older.

3/11/38.—Larvae are still emerging, at the rate of 5 or 6 daily, in the glass cage. Emergence takes place between 7 a.m. and 7.45 a.m. and between 4 p.m. and 5 p.m.

KEY TO ILLUSTRATIONS

Fig.

- I—Eggs of Mountain Grasshopper, as deposited on muslin roof of their cage.
- II—Female larva (enlarged), about 42 days old, photographed two days after ecdysis. Orange collar, and one wide orange abdominal band, clearly defined. Other orange bands not so definite. Note the white bands on the antennae.

ACKNOWLEDGMENT.—I am indebted to Mr. O. H. Coulson for the photograph of the female larva on page 121, and to a Sorrento friend who helped me in my search for eggs, and who has posted me supplies of Ragwort for the larvae.

Plate IX



Thyme-Beard Heath, *Leucopogon thymifolius*

A TRIP TO THE GRAMPIANS

By IVO HAMMETT

Much has been written about the Grampians flora, but the following account of a recent trip to the Grampians by Mr. H. T. Reeves and myself may be of interest in view of the rapid changes being wrought by the influx of tourists due to its popularity. However, all the changes noted were not for the worse. We noted many magnificent specimens of *Callitris cupressiformis*, but Mr. D. Sullivan, in his *Census of the Grampians Flora*, states that this plant, at one time plentiful, is totally disappearing.

Our *piéd à terre* was the Picnic Reserve at Hall's Gap, and a walk before breakfast up Stony Creek revealed much of interest. *Tetratheca ciliata* was the dominant feature, as indeed it was, throughout most of our trip, the overhead canopy of trees being very much to its liking. *Marianthus bignoniaceus*, with its lovely orange bells, was plentiful, although young plants were scarce, a result, no doubt, of the unusually dry season. Farther on, a magnificent plant of *Astroloma pinifolium* was seen and photographed, but this plant appears to be somewhat scarce. Its attractive yellow flowers and graceful foliage make this a splendid garden plant, and so a supply of seed was gathered. The showy *Bauera* was very plentiful, and was a truly magnificent sight. *Prostanthera rotundifolia* was plentiful, but mostly somewhat dwarfed. Orchids were scarce, but white specimens of *Glossodia major* were seen frequently.

On this occasion a few plants only of *Humea elegans* were seen, and I am informed by local residents that this plant is very erratic—some years, seedlings appear by the thousand, and other years young plants are almost non-existent.

Another morning walk was that up Chautauqua Peak. This was the home *par excellence* of the *Thryptomene*, which covered the rocky hillsides with a mantle of white. *Goodia lotifolia* seen here differed somewhat from the Gippsland variety in that the black centre of the flower was very conspicuous. Many plants of *Coprosma hirtella* were passed; with its thick, fleshy leaves, this plant in its juvenile stage is very attractive. The summit of the peak was carpeted with the beautiful little rosettes of the Bristly Trigger plant, *Stylidium soboliferum*, and the rocky ledges adorned with the bright-blue flowers of *Stypandra glauca* reminded one very much of the Strathbogie Ranges.

Another short walk was that up Boronia Peak, where the dwarf *Boronia pilosa* was very abundant. As one walked along, crushing plants and flowers underfoot, the air was filled with its pungent "perfume." The taller *Boronia pinnata* was plentiful in the rock crevices. This was one of the earliest Australian plants cultivated in England. Dr. J. E. Smith states that this plant flowered for the first time in Europe at Lee & Kennedy's nursery, Hammer-

Pine Heath. *Astragalus pinetorum*

smith, in 1795. *Grevillea oleoides* and *G. ilicifolia* were plentiful en route, but the dominant feature was *Dillwynia floribunda*.

A full day's trip was that to McKenzie Falls. Near the Moora turn-off, a fine plant of *Styphelia adscendens* was photographed in full bloom, and we saw near here a specimen of *Leucopogon thymifolius*, 4½ feet high, completely dwarfing surrounding plants of the same genus. (See illustration.) Farther on, some *Sprengelia* marshes were passed, and it was on the borders of these that we saw the first flowers of *Calceolaria cyanea*, some being right at the roadside. Alongside the road, above the Falls, the conspicuous red flowers of *Daviesia brevifolia* were seen. It was but a few miles from here, on the banks of the Glenelg, that Major Mitchell noted this plant in 1836, but he calls the flowers purple. He also describes *Phobosium bilobum* as having bright red flowers, but those we saw were white or pink.

Another trip was that down the Wannon Valley, a feature of which was the extensive *Sprengelia* swamps. It is interesting to note that Dr. J. E. Smith described *Sprengelia incarnata* fully in 1794, and mentions that it was cultivated widely in England at that date. Some very tall plants of *Pinetia ligustrina* were seen at the Jimmy's Creek Bridge, and the colouring here of *Rauera sessiliflora* was finer than that seen anywhere else in the Grampians.

Another run by car was made to the Moora Valley, the car being left at the ford three miles from the Mt. Victory Road. Between the Mt. Victory Road and the ford we saw and photographed some magnificent clumps of *Astroloma conostephoides*. Proceeding upstream, we found ourselves immediately in a natural rock garden, which extended for miles. *Grevillea alpina*, which we had seen elsewhere as a shrub, here assumed a prostrate form, trailing over the rocks in compact clumps, sometimes eight feet across, and the flowers such a blazing mass of orange and gold that but little foliage could be seen. The Crimson Kunzea (*Kunzea parvifolia*) was very plentiful, too, but only a few early flowers were seen. Here, also, we noted *Calytrix tetragona*.

A somewhat strenuous day's trip was that to the summit of Mt. Rosea, where, unfortunately, the Rosy Bush Pea (*Pultenaea subalpina*) was not yet in flower, but many plants were noted. It was interesting to note *Banksia integrifolia*, much modified by its mountain environment, the leaves being leathery and entire, with no trace of serrations. On the way down the mount, the Slaty Sheoke (*Casuarina Muelleriana*) was noted. Returning to Hall's Gap, by way of Dolly's Dell, with its ferny glades and abundance of water, one felt as if suddenly transported to a Gippsland fern gully. Space does not permit of details of the Sundial and Wonderland localities, but these are veritable flower gardens. On the Sundial track, *Epacris impressa* was seen, over six feet high, with magnificent spikes of bloom.

SOME NOTES OF A RECENT TRIP TO CENTRAL AUSTRALIA

By R. H. CROLL

My latest excursion to Central Australia began on May 1 of the present year. With two artist companions, Messrs. J. A. Gardner and Will. Rowell, I set out in a single-vehicle caravan for Adelaide, and went north from that city to Port Augusta—this ending the good roads. From there it was westward, ho! for about 200 miles to Kingoonya.

One feels a sense of adventure as Port Augusta is left, for houses vanish, to reappear only at long intervals, and the Mulga begins in earnest. The Mulga to me, perhaps because of the amazing amount of it in the interior, is always a symbol of the Outback. Mingled with it here were other shrubs, such as the Quandong and the Sheoak, while Salthush stippled every open space.

Heavy rain had fallen two months earlier, and the birds were in great heart. The most noticeable calls were the "Tip-top-of-the-wattle" of the Crested Bell-bird and the melodious outbursts of that Butcher-bird which is known in the Inland as the Jackeroo-bird. At his best, he is a wonderful singer, and in the mating season he and his lady will often perform a duet with (to borrow a phrase from the Customs regulations) "a colourable imitation" of the first bars of the well-known Carnival of Venice.

We were to have these two birds with us throughout the whole tour, but we missed the Magpie from several of our camps farther north, and we lost the Kookaburra altogether. Constant were the Magpie Lark and the Crow, the latter doing good deeds as cleaner-up of camps in particular and as scavenger in general.

Thanks to the generous growth of vegetation, insects were plentiful, and many which appeared unusual were secured for the Melbourne University. Not the least interesting were Silverfish, which were numerous in decaying timber and under stones. What relation these, apparently indigenous, creatures bear to the destructive species of our city dwellings is now being determined at the University.

The customary hospitality of the Outback began with our arrival at the first of the cattle stations, East Well, and was continued at Condambo, both stations owned by the Pick family. Forty-seven miles farther we ran, over patches of the beautiful Sturt Desert Pea, into Kingoonya, to be our final contact with the East-West railway line, for here we turn, roughly, north.

Continued evidence of flooding was the washaway which occurred every few miles, necessitating careful crossing with so heavy a vehicle as ours. Arrival at Coober Pedy (the Stuart Range Opal Field) gave us many tales of the unprecedented floods caused by a district fall of 15 inches in four days. One opal gouger,

away at the time at a neighbouring station, was lost for five days. He was rescued by two aboriginals. His food during the period consisted mainly of tadpoles (eaten raw) and the leaves of the juicy plant *Parakelia*. When at his weakest he followed for some time the calling of a Crested Bell-bird, believing it to be the sound of a horse bell.

Blowflies and Mosquitoes were almost unknown throughout the trip, but the common House Fly more than made up for their absence. Coober Pedy has earned the reputation of being the place where the Flies go to in winter; this time they were at their worst. No wonder the inhabitants live in dugouts. The semi-darkness of these underground dwellings repels the little pests.

Just beyond Coober Pedy (by the way, we were able to send to the Healesville Sanctuary a Barking Gecko from the field) we came on a flock of nineteen Bustards—the "Wild Turkey" of the Inland. Magnificent birds they were, and doing a fine job amongst the Grasshoppers. It is a pity that these useful creatures are so easily approached by motors; every tourist with a gun plays havoc with them.

The large animals of the wild, such as Kangaroo, Emu and Dingo, were little seen, there being no need for them to come to the waterholes along the track while pools still remained farther out. But Ducks were on every sheet of water, and Pigeons (Bronzewing and Topknot in particular) were numerous, as were also Galahs, Black Cockatoos, Budgerigahs and other Parrots, Noisy Minahs, Willie Wagtails (the Titchi Ritchi Ritchi Ra of the Arunta natives), and Finches. In an aviary at one station were sixteen of the graceful-shaped, delicate-coloured Princess Alexandra Parrots, once believed to be extinct, but now being bred in captivity. A pair was sold for £30 a few years ago.

Mottled Red Gums were a delightful feature of every creek bed, and the Desert Oak (one of the *Casuarinas*) often formed groves and avenues of much beauty. Soon, too, we saw the first of the Ghost Gums, those shy Gums which preferably grow on rocky ledges high up the hillsides, but are found, too, near river flats. Baldwin Spencer referred to them as *E. terminalis*, but that name seems to have been supplanted by *papwana*. (I have given up attempting to keep tally of the frequent changes in Eucalyptus nomenclature.)

We found Lambina homestead, on the Alberga, a mere shell, it having been gutted by the flood. More than half a mile of sand had here to be crossed, and a difficult task it proved. Our coconut matting (two rolls of 60 ft. each) had to be laid and relaid many times before we reached solid ground. At a station just beyond we learnt that the local creek had run, during that flood, for the first time in thirty-five years.

Alice Springs marked the end of our northward journey. It is

a fast-growing township, and becoming so full of officials that it is earning the title of Little Canberra. A brand-new gaol is its most outstanding feature at present, for that sign of civilization and progress is the first sight seen by the incoming visitor. The settlement has been greatly improved since I first saw it, some ten years ago.

With "the Alice" as a centre, we went out in various directions, camping wherever the scenery appealed to my artist friends. Some large Emu were seen on one outing, and on every rocky hill the Euro (the Hill Kangaroo) were so numerous that in a short walk forty were counted. Stony hillsides were scored with their tracks—tracks so deep that they must represent very many years of use. The Rock Wallaby sat like monkeys on the cliff edges, and performed miracles of balancing as they leaped away. Of Dingoes we saw little this time, and Rabbits were almost as scarce. A Fox was heard one night in Palm Valley, over 100 miles west of Alice Springs, and a large Cat—a tame Cat gone wild—was noticed far out in the back country.

It was good to see a multitude of young *Livistonas* coming up in the famous Palm Valley, and in the bed of the Fricke, near the junction of Palm Creek with that river, and it was pleasing to observe the health of the natives at Hermannsburg, a state due to the unfailing supply of water from Korporilga Spring.

Of the natives I can say nothing more in this article, save that they present an interesting study in transition.

A good season has promoted a wonderful growth of wild flowers along the "back track," and, returning, as I did, by railway, I saw Lake Eyre as a sea many miles long, with waves dashing on a sandy beach.

ADDITIONS TO CENSUS

- P.18.—Add *Cleisostoma tridentatum*, Tangle Orchid. E.
 P.19.—Add *Corysanthes dilatata*, Stately Helmet-orchid. E.
 P.19.—*Corysanthes acontiflorus*, Spurred Helmet-orchid. Add E.
 P.20.—*Caladenia Menziesii*, Hare Orchid. Add E.
 P.20.—*Caladenia præcox*, Early Caladenia. Add E.
 P.20.—Reinstate *Caladenia testacea*.
 P.21.—Add *Cryptostylis erecta*, Bonnet Orchid. E. Marlo, r.
 P.21.—Add *Cryptostylis Hunteriana*, Furred-tongue Orchid. E. Marlo, r.
 P.21.—*Pterostylis cyncecephala*, Swan Greenhood. Delete "but E."
 P.21.—*Pterostylis grandiflora*, Long-tongue Greenhood. Add E.
 P.22.—*Pterostylis pusilla*, Ruddy-hood. Delete "but E."

If the member who has in his possession the Club's copy of No. 1 of Vol. I of the *Australian Museum Magazine* (now out of print, and at present unobtainable) will be so good as to return it to the Library, the volume can then be bound.

The Hon. Secretary would be glad to receive from members who may have the opportunity of collecting them, complete specimens of *Wahlenbergia*, including basal leaves and roots, with localities.

FURTHER NOTES ON ORCHIDS OF ORBEST DISTRICT

Having collected and listed Orchids from the Orbest district, I was greatly interested in an article on the subject in the October *Naturalist*. The following additional locality records may be interesting.

On the Marlo Plains, *Pterostylis pedoglossa* was common in the early winter, while *Caladenia curries*, var. *aurantiaca* and *Thelymitra grandiflora* were noted in October this year. *Microtis oblonga* was collected at Emu Creek. In 1937, *Glossodia minor* flowered early, due to dry weather, as did *Cryptostylis erecta* four months later.

Before going to Orbest last December, I was shown the new *Cryptostylis Hunteriana*, and on visiting Marlo and Cape Conran found it wherever *Xanthorrhoea hostilis* grew, bordering the old Benum River coach road for 15 miles. The colony at Marlo is poor compared with others farther on. Our marked specimens were disturbed, and on searching in other habitats of the plant we found no signs of its foliage, nor has it begun to send up flower spikes, either there or in our potted specimens, although *C. subulata*, *C. erecta* and *C. leptochila* are all subtending flower shoots.

On the coast, south of Orbest, at the Old Station, and bordering Ewing's Morass, in the sandy soil, Greenhoods abound. Here eight species have been noted, including *Pterostylis curia* and *Pterostylis obtusa*, which are common, while a large colony of *Pt. concinna* was found at the sand dunes.

At Orbest, clearing has almost destroyed some species which favour low country. *Diuris pedunculata* and *Pterostylis curia* grow no more than two inches high, in open paddocks, where sheep graze.

In the higher forest country north and east of the flats, the following have been noted: *Gastrodia sesamoides*, *Protophyllum odoratum*, *P. despectans* and *P. australe*; *Caladenia coerulescens*, *C. deformis*, *C. cordiformis*, and *C. filamentosa* (also at Cann R.); *Microtis parviflora*; *Pterostylis acuminata* (type and var. *ingens*), *P. decurva* (rare), *P. robusta* (one spm.), and the common *Glossodia major* (also the albino form).

In January, 1938, with my brother, I visited the Rodger River country by canoe, via the Snowy River, and located *Dendrobium striatum* in the gorge of the Rodger and on the opposite side of the Snowy, in Jay Creek Gorge. The environs of the Rodger and Yalmy Rivers, although rugged and deep country, and a paradise for a camera man, were disappointing for a botanist, being mainly open stringy Ironbark and Silvertop forest, while the tumbling, rock rivers were lined with *Tristoma laurina*.

Last autumn, *Chiloglottis reflexa* flowered freely throughout the Orbest district, and a few blooms were noted in the spring of 1937.

Cryptostylis leptochila is very common around Murrumbidgee, Callaghan-Tree and Combienbar.

At Combienbar, where I am at present, *Caladenia alba*, var. *picta*, is common, and the type, *C. alba*, is sometimes noted among the colonies of its variety. Here, also, *Caladenia congesta* and *Pterostylis alpina* abound, and *Caladenia praecox* is very prolific, many plants with four flowers being noted.

I have personally observed 56 species growing in the district, and to my knowledge the remote "East of Orbest" has an aggregate of 78 species—half the Orchids of Victoria, and "Tho' much is taken, much abides," for I am sure many other species await discovery, as does *Spicalca irritabilis*, the rare Hammer Orchid, recorded from the east of Victoria, many years ago—a single specimen. Who knows what natural secrets are held by the eastern jungles, the borders only of which have been penetrated?

N. A. WAKEFIELD

Combienbar,

THE 1938 WILD NATURE SHOW

The fifty-third Annual Show was held in the St. Kilda Town Hall on October 4 and 5, from 3 p.m. on Tuesday till 10 p.m. on Wednesday. The Show was formally opened by the President, Mr. R. H. Croll.

Short addresses were given by the Mayor of St. Kilda (Councillor Mitty) and Mr. E. E. Pescott.

Although the general plan adopted for these shows was, in the main, adhered to, an endeavour was made to impart freshness and novelty to the event. The co-operation of two Government Departments, the University and a Society that had not hitherto exhibited in public greatly helped to its success.

The visiting public, as well as members, have grown accustomed to the magnificent display of interstate flowers made possible by the courtesy and practical help of the Shell Company of Australia, and were not disappointed on this occasion. These flowers, skilfully arranged by Mrs. Charles Barrett and her assistants, were a delight for all who saw them. Granted that the labelling of specimens detracts somewhat from their display from an aesthetic point of view, it is debatable whether such loss would not be offset by the benefit derived by botanical students from their naming. The spectacular value of a fine collection of garden-grown flowers from the home of Mr. Burdett, Basket Range, South Australia, was pronounced.

The table devoted to cultivated Victorian native flowers was in charge of Mr. and Mrs. Jenkins, and there was also a fine collection of home-grown flowers from the garden of Mr. Robinson, of Sale.

District exhibits were not so numerous as in 1936, because of adverse weather conditions, especially in the drought-stricken northern provinces; yet, contributions were received as follow—Eastern: From Mr. Hodgson, including *Tecoma Australis* and *Clematis glycinoides*, etc.; from Mr. Fred Barton, Paynesville, flowers collected on Spermin Whale Head, including *Thryptomene Miqueliana*; from Miss M. Galbraith, flowers of Tvers region; and from Miss Laycock, Sassafraz, branches of the Gippsland Waratah. A collection from Mitcham was provided and named by Mr. J. W. Audas. From the Western District, flowers from the Grampians by Miss Ranford (Ararat), by Mr. Hammet and Mr. Rees, and by Mr. Rogers, of Hall's Gap, were shown. Little was expected from the dry Northern areas, nevertheless, Mrs. McNerny managed to send from Bendigo a much-appreciated contribution, which included *Grevillea lanigera*, *Eriostemon*, *Baeckia* and Orchids. From the Mallee region, more particularly the Little Desert and its environs, Mr. H. Smith, of Horsham, sent 50 species, named by Mr. Swaby. A valued contribution came from The Field Naturalists' Club, Adelaide, and was carefully named.

The Plant Classification Section, presided over by Miss Jean Galbraith, assisted by Dr. C. S. Sutton, Miss Smith and Mr. T. S. Hart, gave students from secondary schools preparing for Intermediate and Leaving Examinations much benefit. More space would have given Miss Galbraith better opportunity, but, as it was, she is to be heartily congratulated on her effort. This section was considerably helped by the University, through Professor Turner, in lending the Botany School's large models of flower types with which to illustrate the orders shown.

The only Natural Order allowed a sectional distinction was the Orchidaceae. Mrs. Coleman, assisted by Miss Coleman, had charge of this. Her exhibit is always a popular one, and this year the inclusion of the University's Orchid model increased the educational value of the display.

The Sales Section was in two parts, the pot plants, in charge of Mr. Salan, and the cut flowers.

In any report of a F.N.C. Show, reference to the flowers may seem to be out of proportion to that given other sections, but that is because the flowers determine the actual date, and indeed the very holding, of the Show, and

also because, as to exhibits, they are so obviously the most important. Other exhibits have interests and values indisputably their own. Beauty in form and colour was to be seen in plenty in the sections of Entomology and Conchology, in the glass tanks of the aquaria, and in the cases where Snakes lay immobile but alert, etc. The Entomological Society's many cases of insects (Mr. E. Wilson in charge), ranging from almost invisible Beetles to large and gorgeous Butterflies, provided interest for both casual sightseer and scientist. So, too, did Mr. Burns's collection adjoining.

In Mr. C. Gabriel's section—Conchology—the exhibit was more intelligently examined this year, because of the increased sale of his *Victorian Sea Shells*, published by the Club. A table bore a specimen of every shell illustrated or described in the book.

Next to the Shells was Mr. G. Malcolm's Reptilia, the most popular exhibits therein being the Diamond Snakes and the Green Tree-snake from Queensland.

The Geological Section was in two parts, one provided by Mr. Collier and Mr. Frostick, largely for the information of students, but with paleontological information of interest, the other by the Department of Mines (to be referred to later).

The informative exhibit staged by the Anthropological Society, with easily-read descriptions prepared by Mr. A. S. Kenyon, was arranged and superintended by Mr. S. R. Mitchell, and the weapons and implements of the Stone Age people of Australia gave rise to much questioning by visitors concerning them and their makers.

Adjacent to this, The Gould League of Bird Lovers showed a large collection of coloured drawings of birds, the work of young school children. Many were so good that much may be expected of these juvenile artists in later years. Mr. A. H. E. Mattingley and Mr. Beck attended and supplied information to many enquirers.

In one corner of the main hall, Mrs. V. H. Miller and Mr. Charles Daley had charge of sales of books on natural history and exploration. In another corner, Mr. and Mrs. J. Fieane had staged attractively an exhibit of marine life.

Special exhibits were provided by the Forests Commission and by the Mines Department.

The Forests Commission, in its effort to check erosion of hill and plain, accepted the invitation to demonstrate the methods advocated and exhibited two models of farms, one where faulty clearing and cultivation had led to erosion of gullies and sheet erosion of slopes, the other illustrating the control of the rainfall by contour cultivation. The Commission also showed photographs of historic and present tall trees and samples of timber.

The Mines Department exhibit included cases of model gold nuggets and their histories, and other geological objects, but its main exhibit, and one of the most popular in the hall, was the illuminated glass model of the Morning Star Mine, in the Woods Point goldfield. This was a fascinating object, and most instructive, departmental officers being in attendance to afford information to the many questioners.

The centre of the main hall was, as before, graced by the gorgeous pyramidal centrepiece of Waratahs from New South Wales (in care of Mr. Sarovitch, assisted by Miss Peggy Sarovitch).

The Burnley Horticultural Gardens' exhibit, by the young lady students, took the shape of a sloping garden sample. In the centre part of the large supper room, with Miss Wigan in charge, marsupials were shown. There was the popular "Weanda," the young Wombat of Flinders Island, on loan from the Sir Colin Mackenzie Sanctuary, and the rare animal, Cuscus, from York Peninsula, an interesting Phalanger, which had only once before been sent in Melbourne, and now exhibited by Mr. Ken Niall; and from the Toolern Vale Sanctuary, by courtesy of Mr.

V. H. Davey, and destined for the Sir Colin Mackenzie Sanctuary, a Ringtail Opossum, and two Silver-grey Opossums—one with a "joey" on back.

Photographs showing fauna and flora of Queensland, Tasmania and New Zealand were on loan from the respective Governments.

The Aquarium and Terrarium Society staged what, in the opinion of many, was the most striking exhibit. A row of glass tanks, artificially aerated, illuminated and warmed, contained many interesting tropical fish, and, incidentally, some rare aquatic plants. One tank contained two creatures which one reporter described as "the sullen Mexicans," the Mexican Lung-fish (*Aratostylis*), weird amphibians of the Salamander family. In another tank was the delicate and graceful Cabomba, a tropical American plant, still rare in Australian aquaria.

Finally, a portion of the long supper-room was partitioned off for lectures by the Forests Commission on Forests and Forestry, Erosion, etc. The Commission's lantern, sound apparatus and amplifiers, were used here very effectively by Mr. M. E. Bill to show coloured slides, including some for the Fisheries and Game Department from Mr. F. Lewis' camera, of Lyre-birds and Koalas. Here, too, Miss Cowper showed a very fine coloured moving picture of bird and animal life provided by Mr. Ken Niall. At scheduled times the songs of Australian aborigines were heard from the lecture-room throughout the hall, these being records obtained by the Adelaide University, and loaned to the Club by Mr. D. J. Mahony, Director of the National Museum.

The thanks of the Club are due to the Government Departments, to the University, to kindred societies already named, and, among many others who helped, to the following: Messrs. Felton, Grunwade, & Duerdins, for loan of bottles; the Public Library, for loan of showcases; the Sir Colin Mackenzie Sanctuary Management Committee, for loan of animals; *The Age* Proprietary, for rolls of paper; and the Shell Company of Australia, for collection and transport of interstate flowers and special plants, and for cases for the construction of the Waratah pyramid. It is impracticable to mention the names of all whose services contributed to the success of the Exhibition, but in the arrangement and care of special floral exhibits, in the main hall and supper-room respectively, Mrs. Charles Barrett and Miss Jean Galbraith rendered invaluable service. Mr. B. Blackbourn, as in the past, had charge of the Microscopical Section. The Ladies Committee, under Mrs. Barrett's supervision, did indispensable work in preparation, in sales, caretaking and doorkeeping. In the preparation of the hall for the exhibits, and the dismantling, Mr. Robley, Mr. Dickenson and Mr. Stewart were conspicuously helpful, and, needless to say, financial matters were safe in the hands of the Messrs. Ingram.

A. D. HARRY, Exhibition Secretary.

In order to defray the expense of the purchase of the small area of ground adjoining the grave of the late Baron Ferdinand von Mueller, which might otherwise be used in such a way as to obstruct the view of the monument, and to obtain more ground for the planting of suitable shrubs, members are invited to contribute each the sum of one shilling.

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December 7, 1938

No. 660

THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, November 14, 1938. The President, Mr. R. H. Croll, presided and about 100 members and friends attended.

SUBJECT FOR THE EVENING

As arranged, the subject was a lecture by Dr. R. T. Patton, Senior Lecturer in Botany at the Melbourne University, on "The Early History of the Genus *Eucalyptus*." This was, actually, information obtained by research done in various European *Herbaria* by Dr. Patton, and a great deal of interesting information that was entirely new to members. Dr. Patton made special mention of the amount of Australian material from early collections that the British Museum had, and the number of prepared plates of botanical subjects that have still to be published.

At the conclusion a vote of thanks was passed by the members, and Dr. Patton, in responding, promised a further lecture later on.

CORRESPONDENCE

From the relatives of the late Tom Tregellis, thanking the Club for sympathy expressed.

From Miss Elsie Cole, re shooting birds.—Referred to Committee.

Copies of newspaper article, "Don't Get Lost in the Bush." (Distributed.)

REPORTS OF EXCURSIONS

Reports of excursions were given: Upper Beaconsfield, Mr. A. S. Chalk; Mt. Evelyn, Mr. F. S. Colliver; Toorourong Reservoir, Mr. Ivo Hammet.

ELECTION OF MEMBERS

On a show of hands, the following were duly elected as ordinary members of the Club: Mrs. McClelland, Mr. R. G. Painter and Mr. A. P. McLaughlin.

GENERAL BUSINESS

Re Baron Von Mueller's Memorial: The attention of members was drawn to the paragraph in *The Naturalist*, and the reason for the appeal.

Members are invited to attend the R.A.O.U. Camp at Bruni Island, commencing on November 25.

It was announced that a limited number of the "Gould Memorial" issue of *The Emu* was available at 7/6 per copy from the Secretary, R.A.O.U.

A display of pictures by the aboriginal artist, Albert Namatjira, of Hermannsburg would be held at the Fine Art Society's Galleries, 100 Exhibition Street, City, on Monday, December 5, 1938, at 3 p.m. Admission free

EXHIBITS

Miss Knox.—Two water-colour paintings of Waratahs from the Wild Nature Show.

Mr. and Mrs. Dodds.—A large collection of Mineral specimens collected by them during their vacation.

Mr. A. G. Hooke.—Eucalypts recently collected at the Grampians, including *alpina*, *capitellata*, *dives*, *elaeophora*, *goniocalyx*, *macrorrhyncha*, *meliadora*, *obliqua*, *ovata*, *rostrata* (*Syn. cumalduensis*), *Stuartiana*, *viminialis*. Also photographs of *Xanthorrhoea australis* with flower spike 15 ft. in height, in Victoria Valley, Grampians, by Mr. Gilbert Rogers.

Mr. T. S. Hart.—Dissected flower head of *Actinodium*. (A myrtaceous plant in which the head of flowers resembles a composite in aspect, but with quite different details)—a Western Australian species from the Show.

Mr. C. French.—Flowers of *Leptospermum rotundifolia*. (Garden grown).

Mr. V. H. Miller.—Specimen of *Loranthus Miquelii* with very plump fruits. Also flints and freshwater shell fragments from midden at Lake Lonsdale.

Mr. S. R. Mitchell.—Stone artifacts from Durdidwarrah Reservoir, Steiglitz, comprising crescents, points, large and small scrapers, mills, etc.,

Mr. F. S. Colliver.—Red gum wood taken from Yarra River bed during Spencer Street bridge building operations. Eucalyptus leaves in volcanic ash from Mt. Gambier; portion of Ironbark block that had been underground since 1817, George Street, Sydney.

Mr. Ivo Hammett.—Flowers from the following plants, grown in his garden at Ivanhoe;

Sollya heterophylla, *Verticordia densiflora*, *Callicoma serratifolia*, *Sambucus Gaudichaudiana*, *Eustrephus latifolia*, *Pimelea decussata*, *Melaleuca fulgens*, *Callistemon rugulosus*, *C. speciosus*.

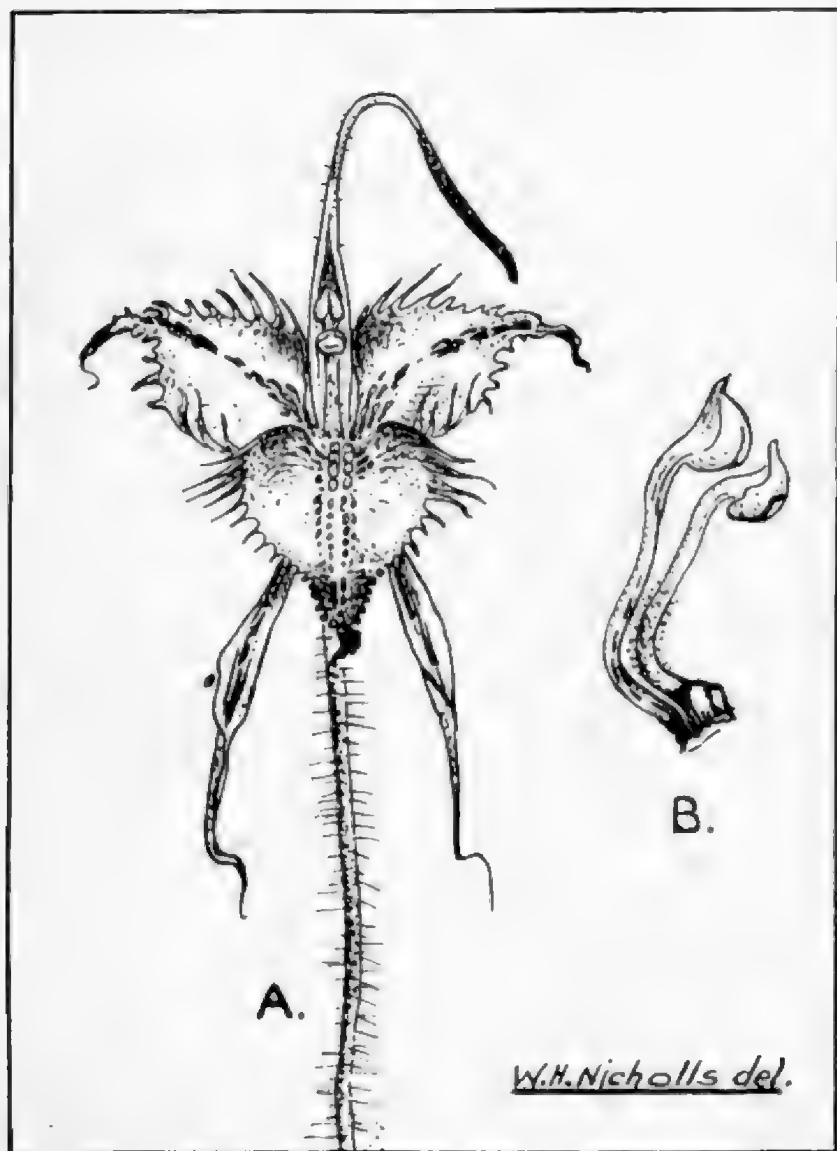
ERRATUM

On page 128, line 20, of last issue, Fricke should be Finke.

A REMARKABLE FLOWER OF *CALADENIA DILATATA*

By EDWARD O. PEScott

A very remarkable flower of the "Fringed Spider" Orchid, *Caladenia dilatata*, R.Br. has been noticed by Mr. John Stevens, of Benalla. Mr. Stevens collected the plant when it was quite young and in foliage growth, at Cheltenham. The plant was transferred to a pot and grown to the flowering stage.

Fringed Spider Orchid, *Caladenia dilatata*.

When the flower expanded, it was seen to be perhaps the most remarkable one ever seen, and probably one of the rarest aberrant forms noted.

The foliage and stem growth were quite normal, with the hairiness of the average plant. The labellum was also of normal form, size and colour, as were the two dorsal sepals behind the labellum. The dorsal sepal, which is placed at the back of the column was normal, except that the clubbing at the end was more pronounced.

But it was in the two petals that the variation was first so extraordinary. The narrow petals were replaced by two very broad ones, of the exact size of the labellum: the colours were identical with those of the labellum, only that the serrations on the edge were not quite so regular. The petals ended in a finely curled tip, instead of the callous tip on the labellum. There were no calli on the petals, an interrupted colour line of purple taking their place.

But the most extraordinary development occurred in the reproductive organs. Normally an orchid carries its reproductive organs on a single structure known as the "column," in which the anther with the pollen grains is situate at the top, with the stigmatic surface placed below.

In the specimen under notice, the anther and the stigma were placed definitely on separate "columns" or stems: the anther had a very definite filament, while the pistil and the stigma were separately distinct.

Such an occurrence in orchid flowers must be exceedingly rare; indeed, this specimen may probably be unique.

The production, on the part of this flower, of separate reproductive organs is very hard to explain. Some would say that it is an attempt to show the descent or the development of the floral organs of an orchid; others will describe it as mere "freakishness." Whatever it is, the flower is very interesting, and it is certainly worth recording. The illustration by Mr. W. H. Nicholls records the occurrence very faithfully.

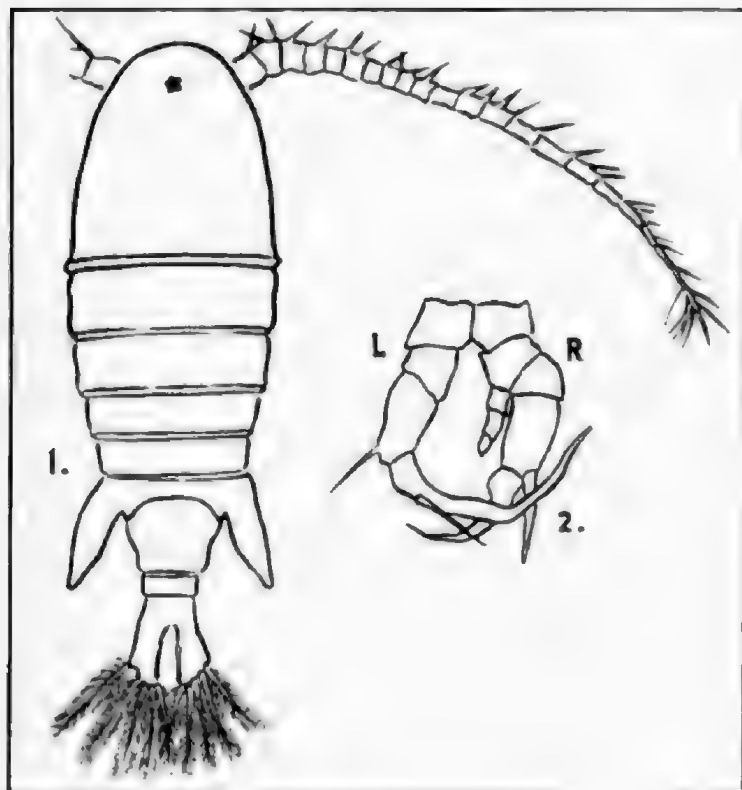
VICTORIAN COPEPODA

By J. SEARLE

The specimen described here was found at Warburton in May, 1910, and named provisionally *Roeckella major*. For some reason or other, probably for want of leisure to sketch it, the description and figure were never published, and for the last twenty-eight years it has appeared on lists of specimens taken on excursions of this and other clubs under its manuscript name, *Roeckella major*.

This remarkably handsome *Copepod* is found in many places

along the Yarra valley and is the largest of our fresh-water *Copepods*. It is very variable in colour, sometimes being red, at others blue or even particoloured, the front half being blue-violet and the hinder part red. It is a slow swimmer, and is never found in shoals, seldom more than three or four being taken in a cast



Boeckella major.

1. *B. major*, ♀. 2. Fifth thoracic legs, ♂.

of the net. It is generally found swimming near the surface of the pool in which it lives. It is so conspicuous that after a flood in the Yarra I have sat on the top of a three-rail fence at Alphington, near where the paper mills now stand, and dipped up individual specimens of *B. major* with my net as they swam in the water at my feet.

In general appearance and structure it resembles *B. robusta* Sars; but differs in the female which is more oblong in shape, and the expansions on the last thoracic segment are much more divergent in *B. major*; and in the male there is a difference in the shape of the fifth thoracic legs.

Length ♀ 3.35 mm. ♂ 2.75 mm.

Locality.—Warburton, Alphington, Daylesford.

LIST OF ORCHIDS RECORDED FOR EAST GIPPSLAND
(FROM THE TAMBO RIVER EASTWARDS)

To Supplement "The Orchids of Orbost District" (F. Robbins),
Victorian Naturalist, Vol. LV 108, October, 1938

Dendrobium speciosum. As recorded by Mr. Robbins. However, at Stony Creek, it is not entirely on private property, although probably most of it is. Some plants are on the permanent reserve along Stony Creek, and others on Crown Land on the western bank of the creek. The creek reserve may eventually be widened on each side, to include all of the orchids. Plants of this orchid have also been established at Kowat, one growing well on a tree-fern.

D. striolatum. Also at Stony Creek (Genoa), and at Buchan (Buchan River).

Sarcochilus fulcatus. Known only at Noorinbee (Cann River).

S. parviflorus. Cann River, in the vicinity of the township. This is my only record, but it is reliably known to occur in several different places throughout the southern parts of the district.

Prasophyllum brevilabre. Widely spread and fairly common, both in the coastal districts and inland on the hills.

P. australe. Fairly common at low elevations, usually on damp flats.

Gastrodia sesamoides. Scattered throughout the mountain country ascending to 3,000 feet, near Bendoc.

Dipodium punctatum. Widely spread throughout the district, except at high elevations, usually on poor dry soil. The most common orchid of late summer.

Caleana major. Marlo. Reedy Creek (near Cann River). Genoa.

C. minor. I have found this species only at Marlo, but it has been reliably recorded near Bairnsdale, and probably occurs elsewhere.

Calochilus cupreus. This is Mr. Robbins's record, for Marlo. I have not yet recorded this species.

C. Robertsonii. Scattered throughout the southern and central parts of the district.

Thelymitra irioides. Common chiefly in the coastal districts, but extending well inland into the hill country.

T. aristata. Deddick River. Tubbut.

T. pauciflora. Although E. Victoria is not given as a habitat in the *Flora of Victoria*, this is a fairly widespread species, at least in the county of Croajingolong. Mr. Robbins records it as in abundance at Orbost. I have seen it also in abundance at Combienbar and at Cann River, and fairly abundant at Kowat.

T. grandiflora. Scattered through the mountain country, and ascending to the subalpine districts at Bonang.

T. flexuosa. Marlo. Newmerella. (On the coastal grass-tree plains.)

T. Elizabethae (if correctly described in the Flora). Scattered through the district, and not at all uncommon.

Microtis oblonga. Combienbar, Club Terrace. I have only these two reliable records, but believe it is not uncommon.

M. unifolia. Very common and abundant in the southern parts of the district.

Corysanthes unguiculata. Marlo, and not yet found in other parts of the district.

C. aconitiflora. Mr. Robbins has recorded this species as very rare at Marlo, and I myself have seen very little of it there: but it occurs in fair abundance at Newmerella, a few miles away and on the other side of the Snowy River. I have not yet found it elsewhere.

C. sinbiata. Bairnsdale, Marlo, Genoa. Generally not far from the sea-coast, and abundant in some localities.

C. dilatata. This is Mr. Robbins's record, for Marlo ("very rare"). I have no record of this species myself.

Acianthus caudatus. Bairnsdale, Newmerella, Marlo, Reedy Creek (near Cann River). Not at all uncommon.

A. exsertus. Widely spread in the coastal and near coastal districts, on sandy soils, and abundant in many places. Probably the most common orchid of the autumn.

A. reniformis. Marlo, Bairnsdale. I have not yet recorded it elsewhere, but in both these localities it grows in abundance on loose sandy soils, and it is possibly fairly common.

Eriochilus cucullatus. Widely spread through the whole district, from the coast to the highlands. A very common orchid of early autumn, frequently appearing in late summer.

Lyperanthus nigricans. Marlo, Reedy Creek, near Cann River.

L. suaveolens. I have only two records so far, Marlo, and Noorinbee (Cann River). But it may not be uncommon.

Glossodia major. Widely spread throughout the district, and very common.

G. minor. Genoa, Cann River, Newton's Creek (14 miles east of Orbost). Apparently confined to Croajingolong.

Caladenia Menziesii. Not uncommon in the Cann River district, though I have not seen it elsewhere. Mr. Robbins has recorded it for Marlo.

C. cardiophila. My only record so far is Marlo, but there it is not uncommon.

C. dilatata. Widely spread, except in the sub-alpine districts, and generally very common.

C. reticulata. I have records for a few different places in the Brodribb River, Bemm River, and Cann River valleys. As far as I know at present, it does not ascend to the northern sub-alpine

districts, nor does it descend right to the coast. Mr. Robbins has no record of it for Marlo.

C. Patersonii. As far as East Gippsland is concerned, the "Common Spider Orchid" is the least common of the local spider orchids. I have seen it only about Marlo.

C. deformis. Abundant about Mallacoota, but not yet recorded for any other locality in the whole district. As Mr. Robbins has no knowledge of it about Marlo, it is apparently one of the very few terrestrial orchids which occur in East Gippsland in other places where conditions are all very similar to those at Marlo, without appearing also at this latter place.

C. latifolia. Mr. Robbins has recorded this species for Marlo. I myself have no record of it at all.

C. carnea. The most common orchid in East Gippsland, found almost everywhere throughout the district.

C. carulea. Genoa, Mallacoota, Reedy Creek, Cann River (abundant in some places). Mr. Robbins has not recorded it for Marlo, and I have not seen it there, although it is a species which from its occurrence in similar conditions not far distant I would have expected to find.

C. congesta. Scattered through the mountain country, ascending to sub-alpine elevations at Bonang and Bendoc; not at all uncommon, but apparently not abundant anywhere.

C. præcox. Has already been reliably recorded for Orbost and Cann River districts. I have not yet seen it anywhere myself.

C. testacea. Definitely known to occur in the sub-alpine districts—Bonang, Woongulmerang, beyond Gelantipy. Probably common in other parts of the district; but in all my records previous to this year I have included under this specific name, and indiscriminately, both *C. testacea* and *C. angustata*—the latter being given in *Flora of Victoria* as a variety of the former. Consequently my earlier records are now practically useless for determining the actual occurrence of either of the two species.

C. angustata. From memory, I am quite sure that I have obtained records of this species (as distinct from *C. testacea*, and distinguishable by the strong musky perfume) at several places in the district—Store Creek, near Deptford, and in the Cann River valley, generally in hill-forest country.

Chiloglottis reflexa. Reedy Creek, Cann River, Marlo, Newmerella, Wy Yung (Bairnsdale). Common on loose sandy soils under bracken in the coastal and near-coastal districts, and generally in very extensive colonies, very numerous in the number of plants, but apparently very rarely flowering.

Chiloglottis Gurnii. Widely spread and rather common throughout the district, but more abundant in the mountain country than near the coast; often in dense and rather extensive colonies.

Durris punctata. Bairnsdale, Marlo. Apparently rather uncommon.

D. pedunculata. Bairnsdale, Orbost, Cann River, Delegate River, Bendoc. Widely spread, and growing at any elevation, but apparently confined to very open country, grassy plains and gentle slopes carrying little or no timber and undergrowth, and there often in abundance.

D. longifolia. Marlo, and at a few scattered places in the hill country. Probably not uncommon.

D. maculata. Widely spread and fairly common throughout the district.

D. sulphurea. Widely spread, but less common than *D. maculata*, being more confined to the fairly open country.

Orthoceras strictum. Rarely found at Marlo, and not yet recorded elsewhere.

Spiranthes sinensis (*S. australis*). Apparently confined to the northern sub-alpine table-lands, but there not uncommon, usually in damp or rather swampy places.

Cryptostylis leptochila. Widely spread although not very commonly found in flower; apparently more frequent in the mountain country than along the coast.

C. subulata. Confined to the grass-tree plains and undulations of the coastal and near-coastal districts, but in such localities common and usually abundant.

C. erecta. Marlo. Not yet recorded elsewhere, and certainly rare in Victoria.

C. Hunteriana. Marlo to Cape Conran. No other records yet, and perhaps very limited in habitat.

Pterostylis longifolia. Scattered through the district; rather common but not abundant.

P. pusilla. Cann River valley. Here recorded in several different places, but not yet seen elsewhere.

P. barbata. Marlo. Reedy Creek, near Cann River. No other records, and most probably rare.

P. mutica. Hills about Suggan Buggan, my only record so far. Mr. Robbins has not recorded this species, which must be uncommon.

P. cyanocephala. This is Mr. Robbins's record—Little River, beyond Gelantipy. I have not yet found this species, which, like *P. mutica*, is probably confined to a very small area of the district.

P. parviflora. Scattered through the district from the coast (common about Marlo) to the highlands.

P. falcata. Widely spread in the county of Croajingolong, from the coast to the highlands, and fairly common.

P. pedoglossa. Marlo. A recent record, and not yet definitely known elsewhere, though probably at Newmerella.

P. pedunculata. Widely spread, and fairly common.

P. alpina. Bonang district. This record, very recent, is my only definite one of this species so far.

P. revoluta. Deredick and Suggan Buggan districts, on rather dry and stony soils.

P. acuminata. This is Mr. Robbins's record, for Marlo. I have not recorded the species yet myself.

P. grandiflora. Marlo. Not yet recorded in any other part of the district.

P. nana. I have only one reliable record—Mallacoota; but Mr. Robbins has recorded it as very common at Marlo and it will probably be found in other localities.

P. curta. Cann River, Genoa, Mallacoota, abundant in all three localities, on shaded grass-lands, often in colonies. I have not yet seen it at Marlo, for which locality Mr. Robbins records it as rare.

Pterostylis nutans. Widely spread, except in the northern parts of the district, and probably the most common species of the genus.

P. concinna. My records are of a few places in the vicinity of Lakes Entrance, and a few others in the Cann River district. In each locality this species was abundant. I have not yet found it between these two localities, although it seems improbable that it does not occur. I consider it rather surprising that it does not grow at Marlo, which is between the two places, and where the conditions are very similar to those at Lakes Entrance, where it can be found in abundance. Mr. Robbins records that he did not find this species anywhere in East Gippsland. However, I am satisfied that my own records of it are reliable.

GENUS NOT LISTED IN "FLORA OF VICTORIA"

Cleisostoma tridentatum. As recorded by Mr. Robbins. As yet I have seen it only near Orbost.

DOUBTFUL RECORDS

Prasophyllum elatum. I have some records of this species, marked "very doubtful," most of which have since proved to be *P. australe*. In the absence of preserved specimens, I cannot now include *P. elatum* in my list—I strongly doubt all my records of it, and have not collected it recently.

However, Mr. Robbins has recorded it for Marlo. My reason for not including it in this list is that my own observations have led me to believe that *P. australe* is the most common leek-orchid at Marlo, but Mr. Robbins omits that species. Very probably that is one of the two unidentified species which he has mentioned, but the fact that my two records of the genus at Marlo are *P. brevifolium* and *P. australe*, while Mr. Robbins's named ones are *P. brevifolium* and *P. elatum*, makes me suspect that each of us refers to the same two species, though of course this may not be so. I can rely on my own two determinations, as you (Mr. W. H. Nicholls) have identified both for me, including, I think, specimens actually from Marlo.

Prasophyllum patens. In your notes published in the issue of the *Naturalist* for last April, you include this species on the evidence of a specimen received from me, obviously about last October, from Marlo. This specimen must have been included among some *P. australe* and *P. brevifolium*, sent by me without any recognition of a third species being amongst them. I have no comparable specimen myself, and until I have some practical acquaintance with the species I am not including it in my own records. Actually this is not a doubtful record, and it is reasonable to presume that this is one of the two unidentified species which Mr. Robbins has collected at Marlo. (Correctly determined—W.H.N.).

Calochilus paludosus. Reedy Creek, October, 1935. I have this one record, based on a single specimen collected, which was useless for preservation after I had dissected it for examination. The plant grew on a low rise, which struck me as inconsistent with the specific name; while the *Flora* records this species as confined to S.W. and S. Victoria. It was these two discrepancies, and not any real disagreement with the description of the species, that made me a little doubtful about the correctness of my determination; and I have since found that no real importance can be attached to either. However, it is possible that I have made a mistake, and I have never come across another specimen of this species; until I do so, I am still considering my old record as open to doubt.

Microtis parviflora. Perhaps common. I have many records, but have never been able to make a complete distinction between this species and *M. uniflora*, though extreme forms show considerable differences. I believe both species occur commonly, but in the absence of any authentic identification of *M. parviflora*, I consider its occurrence doubtful enough to exclude it from the above list. I wish to be as accurate as possible.

Corysanthes diemenica. Genoa, August, 1935. A very doubtful record, never confirmed.

Pterostylis obtusa. Bendoc, February, 1934. An extremely doubtful record, never confirmed, and probably incorrect.

In addition, *Thelymitra venosa* has been found on the Monaro table-lands of New South Wales only a few miles from the State border, and probably occurs also in the adjacent parts of Victoria, although I have not yet come across it there.

W. HUNTER.
October 12, 1938.

It has been a matter of great regret that the finances of the Tasmanian Field Naturalists' Club have been such that the issue of its journal has been prevented for some considerable time. It is now about to recommence the record of its activities with a quarterly "review" issue. This will be learnt with some satisfaction, but it is to be hoped that the Tasmanian Club will soon be in a position to publish its journal in its original format.

ENGRAVED PEBBLES FROM SOUTH AUSTRALIA
OF UNKNOWN SIGNIFICANCE

By C. P. MOUNTFORD

(Acting Ethnologist, South Australian Museum)

Within the last few years engraved pebbles have been found in widely separated parts of South Australia, extending from Pedlars Creek near Moana, to the south to Morowie Waters at the eastern opening of Mount Chambers Gorge, on the Northern Flinders Range, about four hundred miles north. One specimen, i.e., B, fig. 1, is reputed to have been collected on the River Darling.

Mr. H. M. Cooper, whose systematic collecting of stone implements in South Australia has led to some interesting results, has been fortunate enough to have found many examples of this curious type of aboriginal handicraft (see A, D, E, F and H, fig. 1). Others (B, C and G, Fig. 1) were already in the South Australian Museum collection, the writer, himself, being associated with the finding of the example from Pedlars Creek.

DESCRIPTION

Sketches of eight of these engraved pebbles are shown in Fig. 1. All are decorated with straight line marks apparently cut into the surface with the sharp edge of a stone implement. The marks are definitely of human handiwork and bear no relation whatsoever to those caused by glacial action.

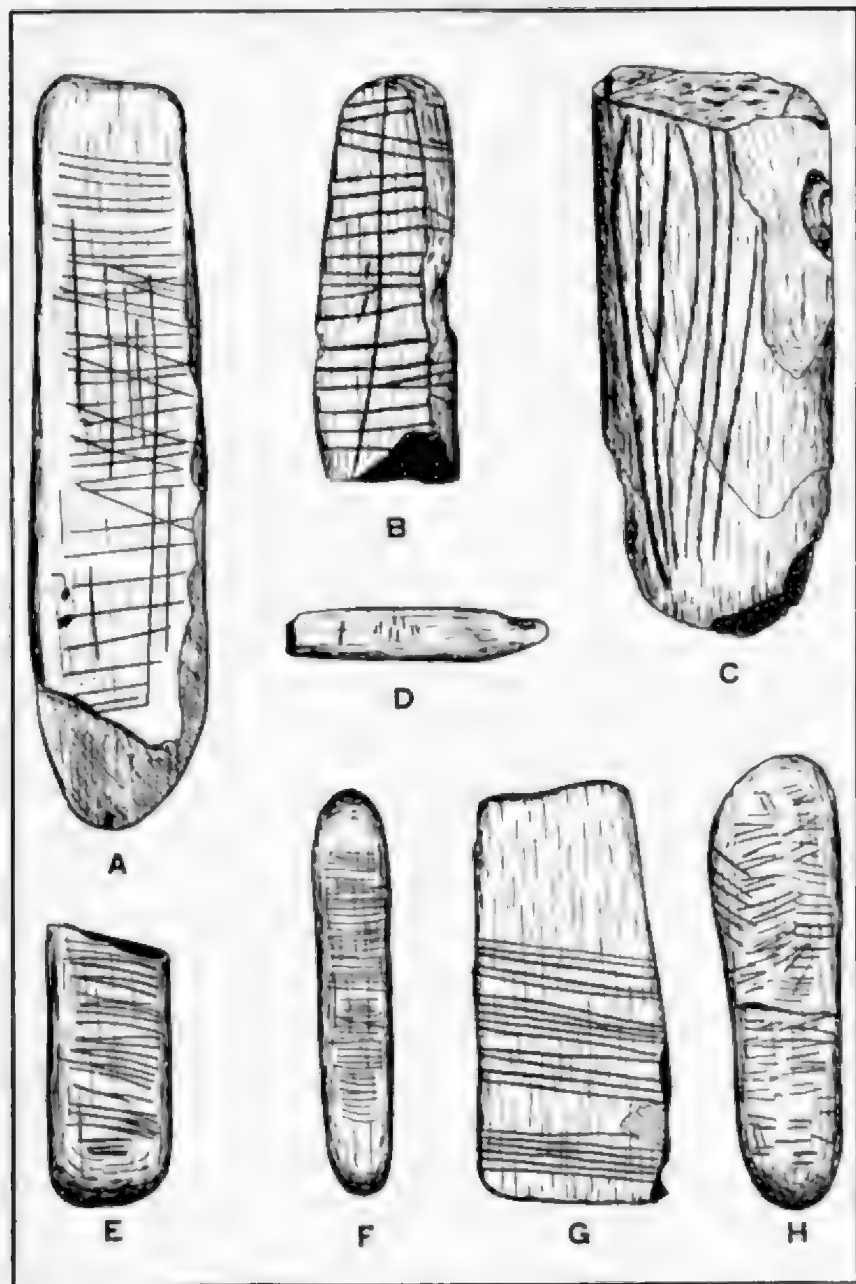
A, fig. 1, was collected at Mathewson Springs about four miles south of Martins Well, Northern Flinders. It is engraved on one side only, is about 20 cm. long, and somewhat rectangular in section. The surface is marked with both transverse and longitudinal scratches.

B, fig. 1, is 8 cm. long and triangular in section and engraved on one face and edge. A single line crossed by another series at approximately right angles extends over the whole length of the stone. This specimen is marked "probably from the River Darling."

C, fig. 1, was collected at Pedlars Creek by Mr. P. Stapleton. It is about 13 cm. in length. The cuts start from a common point at the one end of the stone, and are curved and much deeper than those on the other examples figured.

D, fig. 1, is a portion of a water worn pebble from Kanyaka Creek, five miles north-west of Gordon. This was one of four collected by Mr. Cooper at this place. This stone is about 7 cm. in length, and roughly circular in section. In this case the transverse marks occurred on both sides, but were hardly distinguishable, due, no doubt, to erosion.

E, fig. 1, from the same locality as D, was a portion of a water worn pebble, 7 cm. long, oval in section and marked with transverse lines.



A—Mathewson Springs, four miles south of Martin's Well.
B—Probably River Darling.
C—Moana.

D, E and H—Kanyaka Creek, five miles north-west of Gordon.
F—First Waters, Oratunga.
G—Holowalina Station.

F, fig. 1, is also a cylindrical water worn pebble about 9 cm. in length, which had been scratched on both sides with a series of transverse cuts. This was collected at First Waters, Oratunga Creek, in the North Flinders.

G, fig. 1, was found by Mr. T. Warwick about eight miles east of Holawalena Station and presented to the South Australian Museum by the late Professor W. Howchin. The surface of this stone, which was flat and thin and about 9.5 cm. long, was decorated by three groups of lines cut at right angles to its length.

H, fig. 1, was found at the same locality as D and E, and was in two portions when collected. This example was engraved on both sides, that figured being much the more elaborately marked. The lines are arranged in somewhat a crude herring bone pattern. This stone is oval in section and about 10 cm. in length.

Five out of the seven examples of engraved pebbles were collected on sites where stone implements indicated an aboriginal camping place.

DISCUSSION

There is no evidence to indicate either the use or the significance of these curious objects of aboriginal handicraft. As most of them were found on aboriginal camp sites, it is unlikely that they are of a secret nature. This, coupled with the fact that the transverse marks are similar to those on wooden message sticks suggests that these engraved stones had been used for the same purpose as that of the wooden message stick.

SUMMARY

This short paper records seven engraved pebbles, five of which were known to have been found on aboriginal camp sites. Their possible use and significance is discussed.

EXCURSION TO POUND BEND, WARRANDYTE

Hot, sultry weather did not deter about 16 members and friends from attending the above excursion on November 19. Owing to the exceptionally dry season, bird life was not so much in evidence as on former visits to this locality in previous years. Nevertheless, some 35 species were met with, and an interesting outing resulted.

A number of Yellow Robins were observed nesting, and in every instance, whether the nest contained eggs or young, one of the parents remained constantly standing on the edge of the nest with outstretched wings, sheltering the precious nestlings and/or eggs, from the burning rays of the sun. A visit was paid to the beautifully fashioned cob-web covered home of the Grey Fantail. While we stood alongside, the sitting male bird was relieved from his task of brooding by his mate, the change over being effected in a flash. Several photographs of the bird and nest were taken from very close range without disturbing the little mother, while later on the leader of the party was able to stroke with his hand the trustful little creature as she stuck to her task of incubation. Under

the circumstances, we had not the heart to compel the brave little bird to leave the nest, which it is thought contained eggs. The nest of the Superb Blue Wren (containing three eggs) was found about eight feet off the ground in a *Melaleuca* bush on the river bank. Usually this bird builds close to the ground. Similarly placed, and close by, was the green moss nest of the Yellow-faced Honeyeater, sheltering three young. Many nests of the Red-browed Firetail were seen in the shrubs growing near the water. The cleverly concealed home of the White-browed Scrub Wren was discovered under a small tussock of grass on a hillside and it held three eggs, well incubated. Golden and Rufous Whistlers entertained us most of the afternoon with their usual outpourings of rich melody.

The sight of the day, however, was the Owlet-Nightjar. The bird was seen to fly from a hollow about 10 feet above ground, in a small stringybark tree. Upon peering into the cavity we saw two glossy-white oval-shaped eggs and a recently hatched young bird, clad in a dense coat of pure white down resembling cotton wool. We spent over half an hour at this nest, and during the whole of that time the parent bird sat motionless watching the proceedings from a nearby tree and gave us a wonderful opportunity of studying her very closely. Although not actually rare, this bird is not often seen while the nest and eggs are even less frequently found. The Kunzea scrub was in full blossom, and was much admired, but the Christmas Bush (*Prostanthera lasiantha*), although in bud, had dropped its leaves, and appeared to be languishing from want of moisture, even on the river banks.

A. S. CHALK.

THE MALLEE

According to Mr. Zimmer, Chief Forester of the Mildura district, who has given such a detailed and comprehensive account of the area under his charge in *The Flora of the Far North-west of Victoria*—recently issued by the Forests Commission, the Mulga, *Acacia aurea*, F.v.M., does not occur in this State. The nearest locality where it is to be found, in association with the Belar, is Oil Tank, some 18 miles north-east of Mildura in New South Wales.

In the area controlled by Mr. Zimmer, which is bounded by the Murray, the South Australian border and a line running due east from it through Hattah to Weimen on the river, the only place in which it is likely to be found in Victoria, he has failed also, after considerable search, to find any trace of the Wilga, *Grigera parviflora*, Lindl. which, like the Mulga, is most nearly known about 12 miles to the north-east of Mildura.

Mr. Zimmer, too, is now able to say that *Sarcocolla Grayana* Lindl. the Darling Pea, another doubtfully recorded species, grows on our side of the Murray below its junction with the Darling, and that other rare plants like *Crimm flaccidum*, Herb. the Darling Lily, *Pholidia* (*Eremophila*) *polyclada* (F.v.M.) the Twiggy Emu-bush, *Phyllanthus lucinarius*, F.v.M., Lagoon Spurge and *Abutilon Theophrasti*, Meda the Swamp Chinese Lantern occur in a similar situation. As none of these are to be found above the junction he suggests that the Darling is responsible for their presence in Victoria.

In a supplementary list of indigenous plants occurring in the area under discussion he mentions *Pachycornia tenuis* (Benth.) J. M. Black, a Glasswort, *Salicornia Lyallii*, another Glasswort and *Atriplex halimoides*, Lindl. var. *conduplicatum*, F.v.M. and Tate, a form of the Dwarf Saltbush, not previously recorded for Victoria, all of which can now be included in our Census.

C.S.S.

WAHLENBERGIAS

By A. J. TADGELL

I am sure that many of us are obliged to Mr. F. S. Colliver for asking us to send him, or our young Victorian botanist in England, complete specimens of our lovely Blue-bell, *Wahlenbergia*. From childhood we have loved this flower, perhaps the commonest wildflower in Australia and New Zealand, one that not only has innumerable forms but can be definitely subdivided into many species.

Perhaps to most of us the list of Victorian species published in the *Victorian Year Book* by the Government Statist, 1935-36, by the Victorian Herbarium was our first intimation of this, as we had not seen the *Gardeners' Chronicle* article by N. E. Browne of November, 1913. Some of us have been in communication since with the Herbarium which, as late as February, 1938, decided it would take some time to clear up the position owing to the confusion caused by various writers. I am personally indebted to Mr. Rae and his assistants for valuable information, as I know many members of our Club, following Baron von Mueller and Professor Ewart, have collected *Wahlenbergia marginata* as *W. gracilis* and have been content to let it stop at that.

Our regret has been that it is rarely catalogued by our Victorian seedsmen, though English seed establishments and New Zealand plant merchants feature it, the latter stating *gracilis* is dainty, and easy to cultivate, Laing and Blackwell describing it as one of the commonest of flowers in dry situations, on open plains, and grassy hillsides. I suppose we do not value what is "common." A well-known Victorian seedsmen once told me that he had only to say that a plant was Australian or Victorian when it would immediately be passed over by the prospective purchaser. The Victorian Field Naturalists' Club have, however, in recent years been the means of overcoming this, and very many native plants are now found in our gardens. Surely *Wahlenbergia* might be be grown more in public and private gardens.

How many have noted its various colours from almost white, through shades of pink, to the richest blue. How many have noted the scent in some, the shapes of the petals, rounded ends or sharply pointed, the number of petals (as in the New Zealand species)? Do they know if Victorian species have scent, or have three, four, five, six or seven limbs? or at what stage they flower? I have seen flowering specimens an inch high, others nearly three feet in height. Some plants with golden "backs," others almost white, grow close to each other. Some plants with 30 stems arising from one base have these again divided into as many as 14 branches. Some plants are flowering with filamentous roots, others with stems have the base at least an inch thick.

Do you, reader, think our *Wahlenbergias* are annual or perennial in the absence of observation by cultivation? Perhaps you are inclined to keep to one species, regarding all others as variations, or may consider we have six different species. Many flowers vary in size from the 30 different localities and conditions collected over, where the plants I sent to London were found growing. At Whipstick, Bendigo, the full size of the corollas from outside the one limb of petal to the other outside limb of petal measured only one-eighth of an inch, obviously seedlings. Others from Upper Buckland, Mt. Buffalo, from tip to tip of each of the six partite limbs, measured one and a half inches, and here also grew four-limbed flowers. Ovaries and calyx lobes vary. Plants on the basalt plains have 40-50 flowers. Others, 1-3, and large. By my lists I find that *Wahlenbergia* flower every month of the year.

NOTE.—Mr. Tadgell has sent 30 differing specimens with his field notes to Mr. Noel Lothian.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, December 12, 1938. The President, Mr. R. H. Croll, presided, and about 100 members and friends attended.

OBITUARY

Mr. A. S. Chalk, Vice-President, referred to the death of Mr. Chas. Croll, and asked members to stand in silence as a mark of respect.

CORRESPONDENCE

Gould League of Bird Lovers, with reference to the League's annual meeting.

Preliminary notice of Floral Week, to be held in March, 1939.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as ordinary members of the Club: Mrs. E. Dubois St. Marc, and Mr. K. Byron Moore; and as a country member, Mr. Colin F. Lewis.

REPORTS OF EXCURSIONS

Excursions were reported on as follows: Badger Creek, Mr. Charles Barrett; Blackburn, Mr. V. H. Miller.

GENERAL BUSINESS

Questions by members.—Two questions were asked, and answered as follows:

1. How long do Cicadas remain underground before emerging?—Answer by Mr. Chas. French: About three years, the Australian species.

2. What Australian ducks besides the "Hardhead," dive when only a few days old?—Answer by Mr. A. S. Chalk: Apparently all species.

KOALAS AT COWES

A member reported that apparently some Koalas had been killed at Cowes, Phillip Island, because they were destroying young gum trees. It was decided to bring this matter under the notice of the Fisheries and Game Department.

DESTRUCTION OF TREES AT CHELSEA

It was reported that trees were to be cut down at Chelsea. The meeting resolved that the Secretary be instructed to write to the Council protesting against the proposed action.

NATURE NOTES

Nature Notes dealt with *Wahlenbergia* species, cicadas, slaters, and slugs, albino forms of birds, life of a shell, Bronzewing, Blue Wrens, Ammonites and Trilobites, Koalas, etc.

REMARKS BY EXHIBITORS

Mr. C. J. Gabriel spoke on Cockle Shells, and Mr. S. R. Mitchell on non-crystalline varieties of quartz.

The President wished members the compliments of the season. The meeting adjourned for the *Conversazione* and supper in the lower hall.

EXHIBITS

Miss H. Vale.—Cicadas from Fern Tree Gully.

Misses I. and M. Knox.—Shillelagh, peat from Cork, Ireland; Ostrich egg.

Miss A. Cornish.—Marine specimens from Summerland.

Mr. E. E. Pescott.—Greenstone Axes, from Samarai, Papua. (Coll. 1898.)

Mr. H. P. Dickins.—Paintings of Wild Flowers.

Mr. A. A. Baker.—Petrified wood, from Deep Creek, Bulla.

Mr. A. H. Mattingley.—Winged seed from Bali, Dutch East Indies.

Mr. C. J. Gabriel.—Marine shells of the genus *Cardium*.

Mr. C. French.—Frame containing nine original coloured drawings of Aust. Longicorn Beetles by C. C. Brittlebank.

Mrs. S. C. Richardson.—Collection of polished Quartz variety specimens.

Mr. S. R. Mitchell.—Collection of polished quartz variety specimens, comprising onyx, sardonyx, jasper, flint, opal, etc., all of the non-crystalline type.

Mr. F. S. Colliver.—Collection of the non-crystalline types of quartz.

ON THE DISCOVERY OF A FOSSIL WHALE IN THE
OLDER TERTIARIES OF TORQUAY, VICTORIA

By B. G. PRITCHARD, D.S.C.

INTRODUCTION

In the early part of January, 1932, accompanied by Mr. F. S. Colliver and Mr. Alan Frostick, I visited Torquay and spent some time in collecting fossils for which that locality is famous. Among other good finds, we detected a few exposed bones in the cliff face about 12 feet above the level of the beach. Several bones were present with a piece of the upper jaw partially exposing three simple conical teeth with their apices well worn down.

As the position on the cliff was a very awkward one it was decided to take out a good solid block with the bones in it, and do the trimming and opening up under more suitable conditions later. After much pick and hammer and chisel work, a block about two feet long by 18 inches wide was detached from the cliff face and gradually lowered down the ladder with the assistance of some interested onlookers. The exact location of this find was barely a hundred yards around the Bird Rock corner, so the first trimming of the block was necessarily somewhat hurried as the tide was coming in fast, but even this preliminary work showed what extreme care would have to be taken, for another bone was just being exposed at the back of the block. It now became necessary to move on with our prize or get a thorough wetting, and when safe from tidal influence several more pounds of matrix were carefully removed.

One of our interested assistants Mr. Grix of Geelong, carried the block to Torquay in his car. Next day I cleaned up the fragment of upper jaw and was able to develop two more teeth, making five in all. Adjoining this is the greater part of the skull, base uppermost. The next piece to be exposed was the other front half of the upper jaw with five tooth sockets showing, but all the teeth had been shed. Then I carefully traced out the lower bone and it proved to be the complete left half of the lower jaw with six teeth in position. I have since opened up the upper surface of this bone and exposed the sockets for the rest of the teeth of the jaw. Behind the back of the skull, the first vertebral bone in a good state of preservation has been opened up.

During the preparation for the removal of the block, a single molar tooth was also obtained which no doubt belonged to this skull. This tooth is of particular interest as it shows characters which will have an important bearing on the generic position of the remains as a whole. Thus gradually the original block has been reduced in size and weight, and more and more interest has arisen as these important relics have been slowly developed. It is possible that a number of additional items may yet be opened up on this specimen.

A little further along the coast, and practically on the same horizon, a number of interesting whale remains were also obtained, including vertebrae very close up to the skull and other bones of this region. From this position I was able, several years ago, to obtain several vertebral bones, and some ribs. Mr. Frostick also secured, from a slightly lower horizon a little further along, near the Fishermen's Steps, a single, simple, conical tooth of the type usually known as *Squalodon wilkinsoni*; but now referred to as *Parasqualodon wilkinsoni*. This does not seem to fit in any way on to the skull and jaw obtained.

PREVIOUS RECORDS

The occurrence of our first fossil whale remains was recorded by the late Sir Frederick McCoy (1), as far back as 1864, when

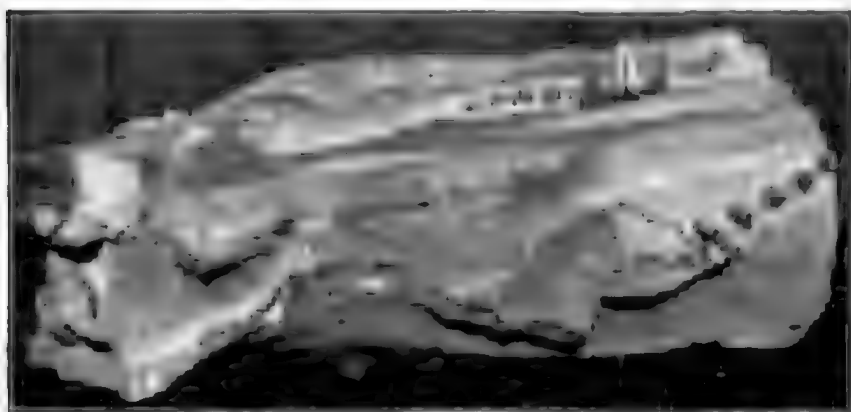


Fig. 1. Top view of teeth and jaws of *Mammalodon coliveri*, Pritchard; also single two fanged molar obtained close to the above specimen.

he wrote a paper for the *Geological Magazine*, and figured and described a tooth under the name of *Squalodon wilkinsoni* from the Tertiary polyzoal limestones of Cape Otway. Cape Otway itself is composed of Jurassic Sandstones, at some distance to the west the fossiliferous clays of the older Tertiary make their appearance but it is not for several miles that the polyzoal limestone is encountered, in the neighbourhood of Castle Cove; and this is the locality indicated in a later paper by McCoy.

In 1866 in one of the Exhibition Essays on the Recent Zoology and Palaeontology of Victoria McCoy (2) states: "The only marine mammal of which I have seen portions which could be identified in these beds is a new species of *Squalodon* or *Phocodon* (*P. wilkinsoni*, McCoy) from the Miocene Tertiary sands of the Cape Otway coast; and as this genus is only known in Miocene strata of Malta and the French Falun, the occurrence of a new species of so restricted a genus is not only valuable as an addition to palaeontology but," etc.:

"The molar teeth of *P. wilkinsoni* are smaller than the Malta *P. scillae* and agree most nearly with the *Squalodon* (*Phocodon*) *grateloupi*, Meyr; of the miocene beds near Bordeaux, from which the Australian species differs chiefly in smaller size, some details of proportions and the relatively larger roots indicating a greater depth of jaw."

In 1875 McCoy (3) described one of the hindmost molars of a Zeuglodon whale from the older Tertiary beds of Castle Cove, near Cape Otway; under the name *Squalodon wilkinsoni*. In 1879 McCoy (4) described a simple, conical, arched, anterior tooth which he attributed also to *Squalodon wilkinsoni*, from the Waurin Ponds limestone quarries and found by Mr. Nelson.

In 1881 E. B. Sanger (5) described a single imperfect molar from the older Tertiary beds of Wellington, Murray River, South Australia, under the name of *Zeuglodon harwoodi*. This specimen appears to have disappeared, for the late Dr. T. S. Hall endeavoured to trace it, but without success. Dr. Hall attaches another specimen from the Mt. Gambier limestones to Sanger's species, and regards it as distinct from McCoy's species, possessing the more slender roots together with a difference in the size and arrangement of the cusps.

Professor Ralph Tate (6) in his Census of the Fauna of the Older Tertiary of Australia, in 1888, lists under Mammalia: *Squalodon*, 1 sp., and *Zeuglodon*, 1 sp.

A molar tooth found at Table Cape, Tasmania, was regarded by Prof. Tate as a *Zeuglodon*, and was given a manuscript specific name, *Z. brevicuspidatus*, but this has not been described, and after personal examination of the specimen Dr. Hall came to the conclusion that it was conspecific with McCoy's species, perhaps being a rather more anterior tooth.

Other odd teeth, incisors, praemolars, and molars, have on various occasions been discovered by different collectors at different localities, chiefly the Spring Creek or Torquay sections, Waurin Ponds limestones, and the Table Cape beds; but no details of any of these have been published, merely being identified as *Squalodon wilkinsoni*, McCoy.

In 1893, R. Lydekker (7) in a paper on the "Cetacean Skulls from Patagonia" describes *Prosqualodon australis* n.g. et sp.-- "An imperfect skull from Chubut belongs to a species of *Squalodon* which, from the character of the teeth and mandible, must apparently be referred to a genus distinct to the one in which all the European representatives of the family have been included in the British Museum Catalogues of Fossil Mammals."

In this specimen the nasals are small triangular bones carried on a projecting ridge of the frontals, and thus, to a slight degree, roof over the nasal cavity. The mandibular ramus curves inwards

in front of the first molar, after which it bends as markedly outwards and the symphysis could not have extended behind the middle of the praemolar series. Apparently the typical molar teeth are reduced to five or possibly six, in place of the seven of *Squalodon*, and four other sockets in the jaw being simple in character, may be reckoned as praemolars.

These differences, according to Lydekker, are amply sufficient to justify its separation from *Squalodon*.

In 1899, R. Lydekker (8) in a paper "On the Skull of a Shark-toothed Dolphin from Patagonia," states: "In *Prosqualodon* from

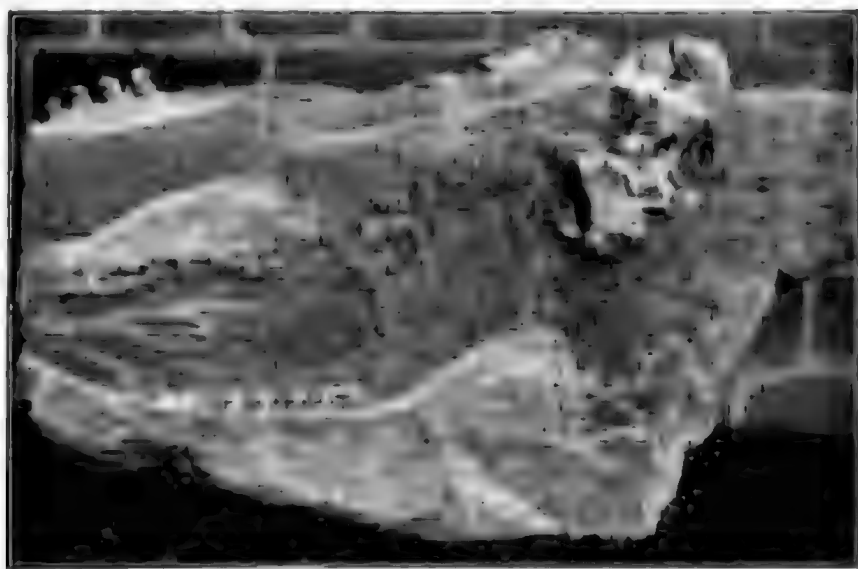


Fig. 2. Side view of jaws and skull of *Mammalodon colliveri*, Pritchard.

the Chubut deposits or Argentina, in the molariform teeth, the fangs have coalesced, but are separated by a deep groove."

In 1902, Dr. T. S. Hall (9) as President of Section C (Geology) of the Hobart meeting of the Australian Association for the Advancement of Science, gave an address "On the Possibility of Detailed Correlation of Australian Formations with those of the Northern Hemisphere." In the course of his remarks on the fauna, after pointing out the possibility of "a southern origin for at any rate some of the Cetacea," he draws attention to a paper by Lydekker in which he proposes a new genus, *Prosqualodon* for a whale having teeth like *Squalodon*, but differing in number, and showing other peculiarities in the skull; Dr. Hall goes on to say: "There is no reason why *Squalodon wilkinsoni*, McCoy, from our Eocene, should not be referred to this southern and older genus, for only a couple of detached teeth seem to be

known." There is, however, no warrant for this, as will be seen by reference to Dr. Hall's later treatment of these remains.

In 1910, True (10) says, "The teeth of *Prosqualodon* which I examined did not exhibit the amount of divergence that Lydekker figured." In 1911, Hall (11) when revising our whale remains of this type, recognized that we did not possess any remains of *Zeuglodon*, *Squalodon* or *Prosqualodon*, and thought it wise to propose two new genera for our southern types, as then known. Under the genus *Parasqualodon*, he places the original *Squalodon wilkinsoni*, McCoy, based on isolated teeth alone; while *Zeuglodon harwoodi* Sanger, also based on isolated teeth is used for founding the genus, *Metasqualodon*.

Thus, according to Hall, two genera and two species are recognized at this date. This treatment was accepted and followed by Mr. F. Chapman (12) in his book on Australian Fossils, in 1914. Then, in 1923, a remarkably good discovery was made at Table Cape by Prof. T. T. Flynn (13), and a descriptive article concerning this specimen appeared in the *Australian Museum Magazine*, entitled "A Whale of Bygone Days." In this article, on page 266, there is an illustration of the scaffolding it was necessary to erect to obtain the specimen from the Turritella beds, Table Cape; also on this page is the figure of a skull of a Tasmanian whale, fully restored, and named *Prosqualodon davidis*. On page 268, a figure is given of a cast of a Tasmanian fossil whale as exhibited in the Australian Museum, a separate molar tooth also is figured, but no dimensions are given and one has only to surmise that the tooth is natural size. In the restoration fourteen teeth are shown in the upper jaw, and fourteen also in the lower jaw:

$$\begin{array}{ccc} 3 & 3 & 8 \\ \hline \text{I. 3, Pm. 3, M. 8.} \end{array}$$

In the cast fourteen teeth are shown in the upper jaw, while only nine are shown in the lower jaw; i.e., seven molars, two anterior, simple, conical teeth worn or broken; possibly there should be three. There appears to be some discrepancy here.

This is certainly not *Prosqualodon*, in the first place, as in the number and style of the teeth it is distinct from Lydekker's genus. If the tooth obtained by Prof. Tate from these beds is referable to this type of whale, and regarded by Dr. Hall as conspecific with *Parasqualodon wilkinsoni*, it opens up the question of referring *Prosqualodon davidis*, Flynn, to *Parasqualodon*.

In 1925 Zittel, (14) in his *Text Book of Palaeontology*, vol. 3, page 86, quotes *Prosqualodon* with five teeth that are two-rooted, and refers to *P. australis*, Lydekker, Miocene of the Argentine, and *P. davidi*, Flynn, Miocene of Tasmania.

Mammalodon. Genus nov.

Roots of molariform teeth relatively long and broad compared

with the crowns, running about three-fourths to one-fourth for the crown, while the width of the root is about half its length.

The groove showing the tooth to be two-fanged starts from the base of the crown on the outer surface, deepening for half the length of the root, the remaining half showing the two fangs free and parallel with a distinct backward curvature, on the inner surface even the crown itself is somewhat indented near the root.



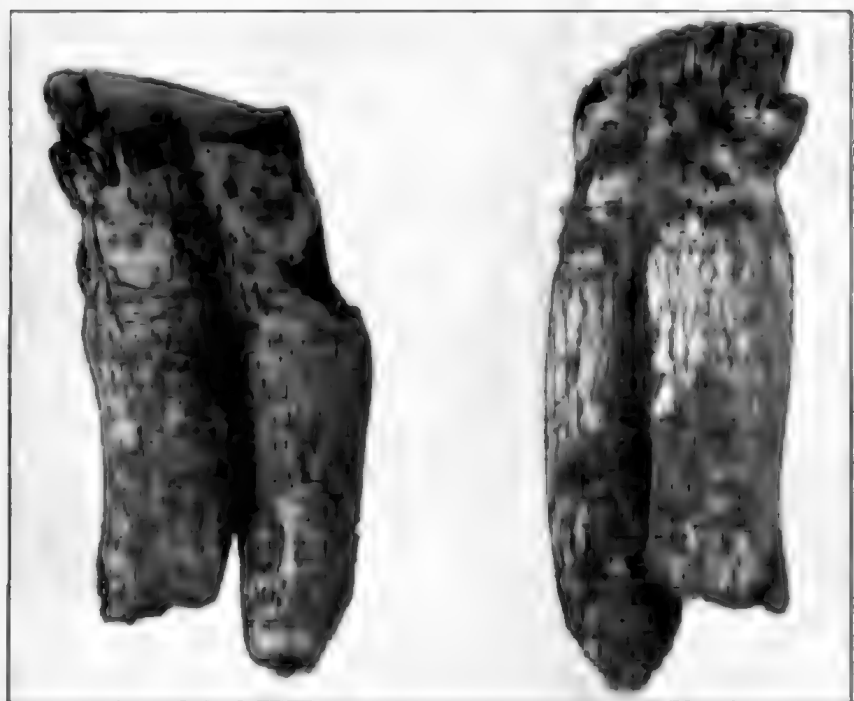
Fig. 3. Posterior view of base of skull of *Mammalodon coliveri*, Pritchard.

The crown is best preserved on the posterior molar where there is one anterior cusp and three posterior cusps with the apex still worn flat, which would seem to suggest the possibility of two small anterior cusps, one larger central cusp, and three smaller posterior cusps. The surface enamel is hard, dark coloured, and finely fluted or wrinkled.

This type of whale is of small and delicate make, in striking contrast to the gigantic *Kekenodon* of Hector, from the Eocene beds of New Zealand, in fact, the smallness of the teeth with their very fine cusps, only three small cusps on the posterior edge on the molar teeth and the relatively very long two-fanged roots are striking characteristics.

The antiquity and adult character of the specimen, notwithstanding its relatively small size, is well shown by the amount of wear and tear on the upper surface of the teeth, the central cusp and the anterior cusps being entirely removed from the praemolar and some of the molar teeth.

Marked features may be summed up as very small crown to length of root, teeth set very close together in groups with a very definite rake, each molar and praemolar distinctly medially grooved



Left: Fig. 4. Internal aspect of Molar Tooth, $\times 2$.

Right: Fig. 5. External aspect of Molar Tooth, $\times 2$.

indicating double fanged teeth, and very large counter-sunk holes for the anterior teeth. Jaw bones very flat and straight.

Mammalodon coliveri. Gen. and Sp. nov.

DESCRIPTION

Right half of lower jaw 34 centimetres in length, with the extreme anterior end incomplete, teeth occupy 10 centimetres of the middle portion; in this space is implanted six double fanged teeth whilst another socket to the front represents a missing seventh tooth. In this portion the jaw tapers from 6 cm. to 4 cm. in depth from the posterior toward the anterior; posterior portion of the jaw increases rapidly to 15.5 cm. in depth.

These teeth, apparently molars and praemolars, have been worn down to such an extent that nearly the whole of the enamel and cusp portion has been removed. As the teeth are set at a definite rake the anterior is worn down more than the posterior, so that the condition as at present shown is that the front praemolar shows no cusps at all, the next tooth shows a narrow rim of enamel, and one posterior cusp, the next an increased width of enamel and one posterior cusp; the next two succeeding teeth show about the same condition, while the posterior tooth shows one anterior cusp and three posterior cusps, while the crown is still worn flat.

The teeth range in width from 16 mm. to 13 mm., exposed root above the jaw 13 mm. in each of the six teeth. Each is strongly medially grooved without showing the bifid nature of the root.

A single loose molar tooth of similar character and dimensions shows a length of fang of 31 mm., the medial groove deepens on both sides until the root is divided for 13 mm. of its length, the side groove, however, is distinctly deeper on the inner side of the root. The enamel is finely corrugated and the cusps are relatively small.

Judging by the position of the skull bones, it appears that the complete skull was approximately 45 cm. in length; width at the back about 15 cm., and across the front or nasal end, in the region of the fifth tooth, about 10 cm.

The front portion of the palate has split into two pieces and fallen apart, the right half has shed all its teeth, but the sockets indicate the former existence of five teeth; the left half still retains its five teeth. The four front teeth are simple, conical, curved teeth, while the fifth, suggesting a praemolar, shows the presence of the side groove indicating a double fang.

Here again the teeth are well exposed from the jaw, showing an exposure of 20 mm., but the crowns are all worn down to a flat surface.

REMARKS

This type of whale would appear to be of an exceptionally interesting and important as well as ancient form. The whole of the bones present have not yet been fully removed from the matrix, and I have no doubt that much more work could be done on them, and their description would be of considerable significance as well. It is, in my opinion, a very early type of Tertiary whale, showing the closest approach to descent from a mammalian type of ancestor. In Zittel's *Palaeontology* (14), volume III, Mammalia, revised by Sir A. S. Woodward, in 1925, page 83, it is stated by Woodward himself that: "The skeleton of this order (Cetacea) is fundamentally mammalian and shows no resemblance whatsoever to that of the fishes or reptiles."

The Cetacea evolved, not from aquatic reptiles, but in all probability from carnivorous, placental land mammals with normal heterodont dentition

$$\begin{array}{ccccccc} & 3 & 1 & 4 & 3 & & \\ \hline 3. & 1. & 4. & 3. & & & \end{array}$$

Our present specimen is a definite link in this direction, and as such, is of special value. I fully recognize that I have not done full justice to such an important specimen, but it seems wise to record the above facts as they appear to me, for the benefit of future work and reference.

The age of the rocks from which the specimen was taken has been and still is a matter of some controversy, ranging from Miocene through Oligocene to Eocene, hence the name *Jan Jukian* for the horizon. Personally, I am still in favour of Eocene, and in this important addition I see nothing to alter that opinion, but rather it seems a further pointer in that direction.

I wish to record my thanks to Mr. Alan Frostick for the photographs from which the figures have been produced, and for very able assistance in the field; also in this respect I desire to include Mr. Stanley Colliver, after whom it has been a great pleasure to name this specimen. I thank Mr. F. Cudmore, librarian of the Royal Society of Victoria, for allowing access to Lydekker's South American work, as well as Mr. Malone, librarian to the National Museum, Melbourne, for assistance in hunting out works of reference in connection with this paper.

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ALBERT NAMATJIRA: AN ARUNTA ARTIST

By R. H. CROLL.

In Central Australia recently I was impressed, more than ever before, by the fact that our aboriginal race is in a very noticeable state of transition. The habits of centuries have become mingled with the ways of the white man; on every hand one may see such anomalies as a native fully clothed but using as a home the wind-break of boughs which served his ancestors, or again a kangaroo being cooked in immemorial fashion by roasting in a pit but eaten with damper made of white flour and washed down with tea. Where, until a little while ago, a deserted camp would yield stone implements to a collector, he is more likely to-day to discover discarded tins.

Out of this confusion, perhaps because of it, has risen a native artist to challenge the white man in the latter's own field. Aboriginal art has expressed itself, down the long centuries, in representation of animals and other natural objects, painted or incised, generally on the walls of rock shelters, or in the decoration in line or in colour of practically every implement or weapon. Sacred objects in particular (*churinga*, bull-roarers and the like) were adorned, often very skilfully, while the more commonplace creations known as dillybags, mere shopping bags so to speak, usually followed graceful lines in their shapes and frequently had bright colours woven in to please the fastidious eye of the maker.

Now, breaking away from all tradition, Albert Namatjira, a full-blood Arunta, appears as the pioneer of a new development. Popularly known by his first name, he has lived the whole of his life with his tribe at the Finke River Mission Station, Hermannsburg, where he still resides. He has an Arunta wife and seven children. On the station, which is some ninety miles west of Alice Springs, he has been waggon-driver, camel man, fencer, and blacksmith, and in all these occupations he stood out above his fellows for intelligence and application.

Two visiting artists, Messrs. Rex Battarbee and John Gardner, showed their work one day at Hermannsburg, and Albert suddenly woke to the consciousness that he, too, could express himself in that way. In that remote spot suitable material is hard to come by, but he managed to obtain some crayons. His first effort pictured the Mission church and one of the dwellings, but the fence in front proved difficult to manage—it persisted in appearing half as large as the house!

Discouraged, but determined to do better, Albert turned his attention to drawing animals on slabs of Mulga and presently his creatures, dogs, kangaroos, lizards, birds and flowers, became life-like. Action pictures were especially good and they found a ready sale amongst the tourists who came that way. In all this he had

Plate X



Photo. by Charles Barrett.

Albert Namatjira



Photo. by Charles Barrett.

Albert painting a Finke River Scene.

no one to teach him, and nothing by way of a guide, save his keen eyes. He wanted to go further and when he learnt that Mr. Battarbee was again to visit the station he offered to work for him as camel boy so that he might gain an insight into the mystery of paint. His equipment then consisted of a writing pad and some pieces of cardboard from matchbox wrappings. That was supplemented when the visitor arrived, and Albert set himself diligently to study perspective and colour and the correct delineation of form.

Eventually came Albert's first watercolour. How he has progressed, and to what excellent effect, could be seen in the collection of his works which was opened by Lady Huntingfield at the Fine Art Society's galleries, Melbourne, on December 5. It was interesting to note his selection of subject, so invariably attractive, and to observe that the colours used by this native of the Macdonnell Ranges support completely the impressions recorded by the few white artists who have visited the red heart of Australia and have had to face an unbelieving public when showing their work in the cities.

Travelling on camelback, in July last, I came upon an artists' camp some twenty miles north of Hermannsburg. It was on the bank of the Finke River, there a sandy depression with no water save in the soak which had been dug by the party. Big red gums, very beautiful, edged the watercourse and formed a delightful setting, two black cockatoos wheeled and called overhead displaying their brilliant tail feathers, and crested bell-birds made a pleasant melody which was just right in the time and place. We hooshta'd our camels down and were greeted by Mr. Battarbee and the quiet, well-spoken Albert and one of his sons. They had made a number of sketches, and next morning, as we said good-bye and passed on, we saw them hard at work again, each at a separate subject and about a mile apart.

Albert is ambitious and his art is raising him above the general level of his people. Pastor Albrecht, of the Mission, describes him as a typical native inasmuch as he has always been part of his tribe, but one anxious to establish a definite link with white civilization. The exhibition referred to is his first real approach to that ideal. It offered the jaded follower of art shows a new sensation, for almost certainly Albert is the first of his people to practice painting as a profession and assuredly also he is the first to make a display in white man fashion.

The Committee of the Field Naturalists' Club of Victoria invites members of kindred societies who may be visiting Melbourne, to attend the Club's meeting.

TOM TREGELLAS

By R. ERASMUS WILSON

As I write this I am sitting by the old crossing over the Yarra at Millgrove, where the timber line from the now deserted mill comes down to the river. Listening to the music of the stream my thoughts go back to old times. Often Tom Tregellas and I boiled the hilly here before starting the long climb up the range to the mill, where we spent many a happy week-end.

Tom was happy anywhere in the bush, but I think he was never so much at peace with the world as when wandering in the beautiful Warburton District. At the old mill the call of the Lyre-bird, in season, could be heard the day long and the gorgeous Pennant Parrakeets used to come in little flocks to forage in the bag mangers of the mill horses for a change of diet. Sitting before the big fire in the hut, Tom often told me of his boyhood days in Huntley District, near Bendigo, and I gleaned that even then he took far more than a passing interest in the flora and fauna of his surroundings.

I first met Tom Tregellas at a meeting of the old Bird Observers' Club, that happy coterie of keen ornithological students that used to meet in the private homes of its members and which numbered amongst its adherents some of the finest ornithologists Australia has ever seen. Tom, Les. Chandler and I soon became fast friends and I can look back on very many delightful excursions that we made, to study the bird life of our State.

In these days we were all keen collectors, but later Tom and Leslie Chandler turned their attentions to bird photography and soon were producing beautiful pictorial records of avian home life. Tom could make an excellent bird-skin and at one time had a fine collection which he subsequently disposed of to Mr. Gregory M. Mathews. He was an intrepid climber and I marvel still at some of the feats I saw him perform. His services were in great demand by other collectors who had located nests that to them were absolutely inaccessible. One of his greatest climbs was to the nesting hollow of a Gang Gang Cockatoo, situated high up in a forest giant growing in the Dandenong Ranges. One of his favourite birds was the Little Penguin, and he made several pilgrimages to its haunts at the Nobbies, Phillip Island. In my study I have a charming picture of the birds that he obtained on one of his trips.

However, Tom will be most lastingly remembered for his work amongst his beloved Lyre-birds. For many years never a winter passed but what he spent almost every week-end in their haunts and I think it might be truly said that he, more than anyone else, was responsible for the general public interest that is to-day displayed in Australia's wonder bird. So that he might be con-

stantly amongst his avian friends he made a permanent camp in a huge hollow log in a densely-timbered gully in the Belgrave district, and the Lyre-birds got to know him so well that they constructed dancing-mounds with a few yards of his camp-fire and gave their peerless performances almost at his very feet.

The old hollow log was aptly named "Menura" and in the years that Tom occupied it he must have entertained a few thousand visitors. He had the honour of entertaining Vice-Regal guests on three or four occasions and many distinguished visitors from overseas gained their first view of our Lyre-birds at the old log camp. Wild opossums used to dine at his camp table and various species of native rats and mice shared his living quarters. Yellow Robins and Harmonious Thrushes were constant attendants at meals, knowing that they were perfectly safe and sure of a share of his provender.

Tom Tregellas became widely known as a lecturer on Natural History subjects and his services were always in great demand. With his unique lantern slides and word pictures he brought the bush to the lecture room, and his fund of anecdote and dry Cornish humour always ensured an interested audience. Although always a devoted bird lover, he had a very great admiration also of our native flora. In latter years he became enamoured with our orchids, his interest no doubt being fostered by a friendship he struck up with Mr. Charles French, a lasting friendship that endured to the very end of his life. Never a year went past but what he journeyed to Woori Yallock to gather the quaint blooms of the orchid *Spiranthes Australis*, and he never failed to bring me a few specimens to place on my office table.

Tom Tregellas undertook several trips to the Mallee country in North-West Victoria, the flora and fauna of which greatly interested him, and he could give a most entrancing talk on his experiences there. For many years he worked at an iron foundry in South Melbourne and it is interesting to note that he left that work to accept a position as a dental mechanic in a Collins Street dentist's rooms, a position which he filled with great success till the return of the original holder of the position from the Great War. His happy disposition made him a favourite wherever he went.

Tom was not an ornithologist or a botanist, or any other ologist; he was a naturalist, and thus he found a maximum of joy on his bush rambles. The pity of it was that this man who delighted in the open countryside should have had to spend the last few years of his life on a sick bed, but right to the end he maintained a brave exterior and even the day prior to his death he was telling a close friend of his about the flowers that would be blooming then on the hillsides of his native Bendigo district.

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NOTES ON *CALADENIA TESTACEA*, R.BR.,
C. ANGUSTATA, LDL. AND OTHER FORMS

By W. H. NICHOLLS

Caladenia testacea, R. Brown, the "Greenie-brownie" of New South Wales orchid lovers, was collected originally in the vicinity of Port Jackson, in 1824. It is abundant still, during the spring months, on the outskirts of Sydney and inland, from the coastal districts to the Great Divide. September and October are the flowering months. The flowers vary in number from one to six.

In Victorian habitats, *C. testacea* appears much earlier than in New South Wales, late July to September in most districts; August being the peak period. In certain seasons it lingers on until early November, chiefly in those districts near the Southern Ocean. (This excludes Alpine regions, where December, January and February constitute the spring months.) *C. testacea* favours scrub-covered lands or stringy bark (*Eucalyptus*) country, usually growing in association with *C. carnea* and *C. alba*, R.Br. In many of its habitats the beautiful Small Wax-lip grows abundantly. I refer of course to *Glossodia minor*, R.Br.—only recently definitely placed on Victorian records.

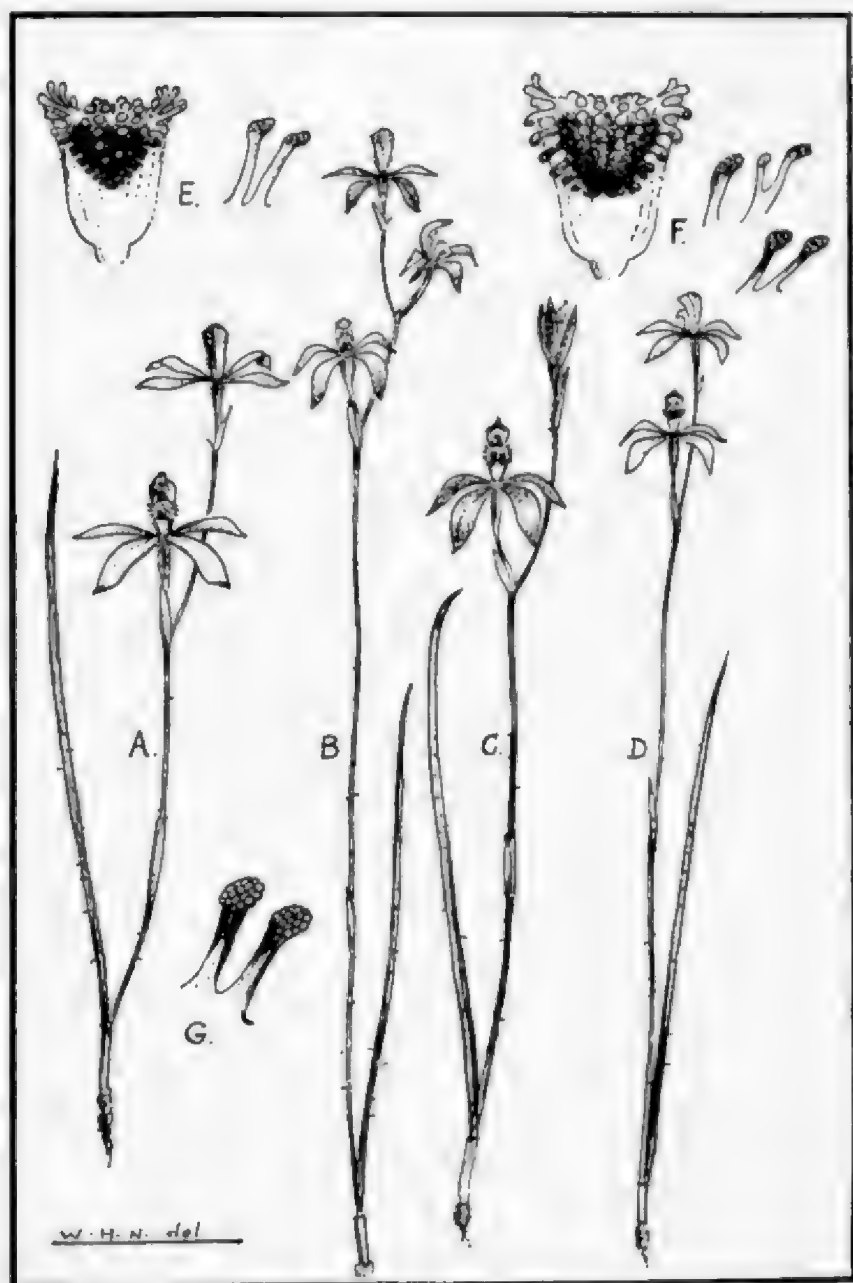
C. testacea was deleted from Victorian records a few years ago. Such a procedure appeared necessary as there was no definite record of this *Caladenia* having been collected in the State. The species which for so long usurped its place on southern lists is *C. angustata*, Lindley, the musk-scented *Caladenia*, which often occurs in great abundance on timbered saddles and slopes where also grow *C. carnea* and *C. dilatata*, R.Br.

C. angustata is distributed throughout Tasmania, South Australia, Victoria and in parts of New South Wales.

In the *Flora of Victoria*¹ *C. testacea* is listed as the "Musky *Caladenia*," and (sic) Lindley's species is recorded as a variety of it. *C. testacea* is never musk scented; (2) instead, a sweet honey fragrance is diffused by its flowers. In New South Wales *C. angustata* is sometimes called "Polecats"; one observer going so far as to record "Blowflies are attracted to it in numbers." In the present writer's experience the scent from a few specimens is a delight, becoming "headachy" only when numerous specimens are handled; a penalty for wasteful collecting.

C. angustata is well worthy of specific rank. The late Professor R. Tate (of South Australia) recognized this and named it *C. quadriserata*, but Lindley's name has priority and must stand. *C. angustata* is as distinct from R. Brown's *C. testacea* as is the more widely distributed *C. carnea*, R.Br. Furthermore, it is far more robust, taller and the flowers are larger.

In *The Victorian Naturalist* (vol. iv, Nov., 1938), *C. testacea* was replaced on the Victorian Census. No data was added. In

*Caladenia testacea* and varieties.

the meanwhile several correspondents enquired the reason, asking for "the story behind the reinstatement." Well, here is the "story."

When the writer visited New South Wales during September, 1935, *C. testacea* was observed *in situ* in the Lindfield district. The flowers, of a pleasing old-gold colour, with brown markings, were plentiful.

Why this *Caladenia* should be dubbed "Greenie-brownie" puzzled me then. "Golden Caladenia" seemed a better vernacular. But it is well to remember the prevailing colour scheme of *C. testacea*'s flowers in New South Wales: "uniformly pale green inside, they are red-brown towards the tips on the hairy exterior of the segments." (3) This outlines the colour scheme of the majority of the flowers of *C. testacea* seen in the past and they were numerous. Furthermore, these specimens from a number of districts were very slender, often attenuated, the flowers about 2 cm. in diameter. In some rare instances they were a pale greenish-white with the brown hardly noticeable.

The Lindfield specimens were identical with the Victorian alpine (Cobungra) *Caladenia Hilda*, Prescott et Nicholls; a little taller and the flowers smaller, but so far as the characters were concerned, no differences of any importance could be detected. The flowers of *C. Hilda* averaged 2.5 cm. in diameter. The colour scheme is a rich gold, dark brown on the margins and on the reverse a pleasing shade of pink at the base of the segments. Labellum white as in *C. testacea* from New South Wales, and purple marked, and the plant rarely exceeded 15 cm., whereas *C. testacea* from New South Wales habitats varied from 15 cm. to over 20 cm. in height.

The flowers of the first found Cobungra specimens and of those collected a season later differed somewhat from the specimens of *C. testacea* previously seen—chiefly in the labella-fringe; this, combined with the richer colour scheme, the dwarf habit of all specimens and the late flowering season (December) strengthened the belief that here existed a new species; and later it was described as *C. Hilda*, the "Golden Caladenia" of Victoria. The truly rich colouring of this alpine form may be due to the rich volcanic soil of the district. The writer has oft referred to the high colour of the flower spikes of the Trigger Plant (*Stylidium graminifolium*) in these regions. The variation noted in the labella-fringe, as previously mentioned, is undoubtedly due to malformation; for later specimens showed no departure from the type—in many individual flowers at least.

So *C. testacea* became reinstated on Victorian lists. Since then other collectors have reported the typical *C. testacea* R.Br. from farther south in sub-alpine regions. W. Hunter and N. A. Wakefield also collected pale forms, white with pink markings—in one locality, white with purple markings. These particular specimens

were exact in all morphological characters with New South Wales specimens of *C. testacea*.

The writer collected somewhat similar material while in East Victoria in 1937. Localities, Mt. Drummer and near Noorinbee (Cann River). Some flowers were deep green with deep pink markings; really a bronze combination, recalling similar forms of *C. præcox* Nicholls collected near Bayswater by C. French. But the east Victorian flowers had the labella-fringe perfectly formed.

The conclusions arrived at after the examination of all this material are strengthened by the receipt of very slender tall-growing (22 cm.) specimens of *C. præcox* from the Lang Lang (Gippsland) district in Victoria. Except in the pale colour of the flowers, these specimens agree in almost every particular with *C. testacea* from New South Wales. Undoubtedly, in Victoria *C. testacea* is represented also by two varieties: *C. testacea*, R.Br., variety *præcox* (*C. præcox*, Nich.) which shows considerable variation as to colour. Plant usually about 10-14 cm. high. Flowers 2.5-3.3 cm. in diameter, usually white with pink markings.

C. testacea, R.Br., variety *Hildæ* (*C. Hildæ*, Pescott et Nich.). Plant 12-15 cm. high. Flowers about 2.5 cm. in diameter. Rich golden yellow with light brown and pink markings.

In variety *præcox*, the perianth is usually more widespread. This accounts for the increase in the given diameter of flowers.

References:

- (1) A. J. Ewart, 1930.
- (2) Several seasons ago a few specimens of *C. præcox* were collected. These possessed a musky scent. They were regarded as hybrid forms.
- (3) Rupp in *Guide to the Orchids of N.S.W.* (1930).

KEY TO ILLUSTRATION

- Fig. A. *Caladenia testacea* var. *Præcox*.
 Fig. B. *C. testacea* (New South Wales).
 Fig. C. *Cal. testacea* var. *Hildæ*, (Victoria).
 Fig. D. *Cal. testacea* var. *Præcox*—white with purple markings.
 Fig. E. Labellum and marginal fringe of *C. testacea* var. *Præcox*.
 Fig. F. Labellum and marginal fringe of *C. testacea* var. *Hildæ*.
 Fig. G. Labellum-fringe (calli) of typical *Cal. testacea* var. *Testacea*. The labellum is exact in shape and colour as in var. *Hildæ*. Fig. F.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall, on Monday, January 9, 1939. The President, Mr. R. H. Croll, presided and about 100 members and friends attended.

The President wished Club members a happy New Year. Some members had been honoured recently: Prof. Agar, O.B.E.; Mr. R. T. M. Pescott, F.E.S.; and Dr. H. Flecker, now of Cairns, but previously of Melbourne, who had been admitted to the Fellowship of the British Association of Radiologists. (Only seven other Australians have this distinction.)

The President welcomed Mr. G. O. Faulkener, a visiting ornithologist from America; and Mr. and Mrs. E. S. Hawks, who recently returned from an extended trip abroad.

"NATURALIST IN BALI"

The subject for the evening was an illustrated lecture entitled "A Naturalist in Bali," by Mr. Charles Barrett. A large and comprehensive series of photographs of island scenery, the people in the villages, and so forth, was shown.

REPORT OF EXCURSION

Mr. J. J. Freame reported on the Seaholme excursion.

ELECTION OF MEMBERS

On a show of hands the following were duly elected as Ordinary Members: Prof. J. S. Turner, M.A., PH.D., and Mr. S. Lamrock; Country Member, Miss G. Crouch; and as Associate Member, Master Tony Clarke.

GENERAL BUSINESS

The President thanked Miss Marion Agnew for her gift to the Club of a book, *New Light on the Far East*, by V. Gordon Childe.

Questions relating to Passerine birds, the Blue Wren, and its supposed polygamy; and the drumming noise made by the Emu, were answered by Mr. A. H. Mattingley; while Mr. C. Barrett answered questions concerning Kangaroos and Wallabies.

NATURE NOTES

Notes were given as follows:

Mr. P. F. Morris: Polygamy and nesting habits of the House Sparrow. Mr. R. H. Croll: Kookaburra catching fish by diving under the water. Mr. F. S. Colliver: On Wombats and *Diprotodon* (illustrated by slides and specimens). (For Mr. C. French) on a Pot-hole stone from the Rubicon Valley.

EXHIBITS

Miss A. Cornish.—Native shell necklace, from Port Said

Miss H. Vale.—Rainbow Mountain souvenir, bought in New Zealand.

Mr. C. J. Gabriel.—New Zealand land shells, including *Paryphanta busbyi*, Gray.

Mr. A. A. Baker.—"Borer" shells, from beach at Dennant Creek, near Frankston.

Mr. C. French.—Pot-hole Stone, from the Rubicon River, near Alexandra, Victoria.

Mr. F. S. Colliver.—Skulls of Wombats, *Phascogaleus mitchelli*, and *P. pliocenus*, also jaw fragment and molar tooth of *Diprotodon*.

Mr. I. Hammet.—Plant specimen: *Humea elegans*, *Solhya heterophylla*, *Persoonia pinifolia*, *Backia nigata*, *Eucalyptus cornuta*.

Mr. H. Stewart.—Fifty species of plants collected at Mount Buffalo National Park (altitude, 4,500 feet to 5,600 feet), including *Eucalyptus viminalis*, var. *racemosa* (not previously recorded for the locality).

The pioneers of a colony of the common House Sparrow (*Passer domesticus*) built their nest in my garden last July. I have observed their habits and was greatly surprised at their increase. The colony practised polygamy. There is a majority of females over males. The polygamous habit evidently is the reason for the great increase of this bird throughout Australia. After the first brood was reared, I noticed them re-line the nest with Chrysanthemum leaves. The leaf of this plant has insecticidal properties. It is certainly very interesting to note that a European bird has discovered the economic property of a Japanese plant.

P. F. MORRIS.

When examining, under the microscope, some material which I had gathered at Port Melbourne with a hand-net, a small, thread-like specimen floated into view. It resembled a fern frond, the branchlets at the sides bearing numerous bells at the tips (mainly seven), altogether about 100. Down the centre of stalk were five larger bells. With a quick movement, the frond curled to the end of the stalk, and, slowly straightening out, threw off a bell, which floated away. By 10 p.m. all the small bells had gone, leaving the branchlets looking like bare sticks. Four of the larger bells were still clinging to the stem. The specimen was less than half an inch in length, and, I think, a member of the family *Campanularia*. The small bells probably were reproductive, and the larger ones, the feeding polyps.

M. E. FREAME.

FIELD EXPERIENCES, IN RETROSPECT

By BLANCHE E. MILLER

Looking back, over many years, experience in the field, it is doubtful if any of my observations were really outstanding. To some, the only interpretation of the term "outstanding" would mean finding a new bird—an extremely rare possibility—or the re-discovery of some long-lost species, or maybe, the finding of nests and eggs hitherto undescribed. Judged by such standards, my most important experience was the locating of a new colony of the Helmeted Honey-eater, and incidentally, arousing a hornet's nest of unpleasantness. Despite the fact that it was the immediate factor in yet another colony of these somewhat rare birds being recognized, the memory is odious.

If, in using the words "outstanding experiences" we mean those little incidents that give untold pleasure, at the time, then it may be doubted if any important work ever gives a greater thrill than the novice feels in seeing an unfamiliar bird for the first time, in sharing family secrets with well-known birds, or once in a way, witnessing a scene, the memory of which needs little stimulus to return with all its original charm.

The sight of Western Australian Everlastings, for instance, brings back vividly to me the undulating flight of a flock of Twenty-eight Parrots as we saw them, for the first time, in the wheat belt, some years ago. Tractors being used instead of horses obviated the necessity for fences, so the road, at that time, was a gravel strip bordered right to the edge of the growing wheat with a carpet of Everlastings, in colours that ranged from white to rose. Many people are apt to think that the prodigious masses of these flowers shown in photographs depict a specially selected area, but for mile after mile we saw them, wherever the soil had not been disturbed by the plough. Wheeling around, and flying beside the cars, were the collared Twenty-eight Parrots—the trivial name for these ring-necks being based on the supposed interpretation of their call. Locally these parrots are not popular with the wheat farmer, on account of the damage they do to the standing crop. For the visitor, the economic aspect was eclipsed by the vivid contrast of gorgeously-liveried birds, and pastel-tinted blossoms; of a golden road bisecting an acreage of grain that extended right to the horizon.

Truly a characteristic Australian scene, yet I doubt if its exact replica could be found elsewhere throughout the continent. Nor will I spoil the memory of it by wondering if it is still intact in its original setting.

Writing of parrots—my favourites among birds—reminds me of a charming little picture which a small party of bird-lovers saw at Dog Rocks, Victoria, a few years ago. Several Swift Parrots alighted on a low, gracefully curved limb of a tree, each facing

the party, their red-lined, pointed tails hanging over in a perky way. It was a fit subject for a Cayley panel, somewhat resembling his well-known "Budgerigars."⁴ Yet that artist was accused by the dry-as-dust ornithologists of exercising too much imagination in the posture of the birds, when he held an exhibition of pictures in Melbourne, about the same time—pictures, be it said, that aimed to be decorative while not sacrificing accuracy of form.

Recently, in New South Wales, I saw Ibis perched on the highest points of dead trees, and the thought occurred to me that we could advantageously use this useful bird in ornamental designs. On the ground it gives the impression of being far too cumbersome as a subject, but perched high up, it gained unbelievably in grace and effect. Why is it necessary to use a conventional bird when we have so much attractive copy right at hand?

Quite often, the student finds that writers of text books omit details that would be of great help to the beginner. As a well-known man once said: We miss much in life because learned people disdain to mention the simple facts, assuming that they are common knowledge. Many years ago, we undertook a trip to Queensland that I have always considered was an important milestone in my study of bird-life. I had just made the all-important discovery that my field-work had, hitherto, been unsatisfying because of my not properly seeing birds. Armed with field-glasses, a whole new world was being revealed to me. At last it was possible to add practical experience to other people's theory. We were in the Brisbane Botanical Gardens where there was much to see that was of interest. "What is the bird over the river?" queried my husband. I looked in the direction indicated and saw a large white bird drifting in the air. Like a flash, a quotation from a popular field book came to mind: "Floats like a great butterfly," a description so exact that it was possible to recognize the White-breasted Sea-Eagle instantly, and accurately.

Early in the study of most branches of natural history it is not unusual to make worth-while observations without being aware of the fact. Knowing that the lore of nests and eggs was a study in itself, for some time I had concentrated more on the identification of the birds in the field. The finding of a nest of the Flame Robin in a cleft of the bark of a tree on Mount Macedon did not seem at all out-of-the-way. But when it was pointed out that some ornithologists asserted that the Flame Robins migrated to Tasmania to nest, and that a recently-published book by a popular author upheld this view, then it became obvious that some little knowledge of the nesting habits of our birds was desirable. A further lesson was learned when we discovered, a week later, that in order to secure a good photograph, the nest had been

⁴Mr. N. W. Cayley on his picture spells Budgerigar as given. *The Official Checklist of the Birds of Australia* spells it Budgerigah.

unduly exposed and subsequently deserted. Sometimes it is unwise to tell all you know.

On the other hand, occasions arise when one feels very sure of having seen something out of the ordinary, but does not possess sufficient confidence in one's own ability to be convincing. Not so long ago a Yellow Robin was foraging near us as we hunched under the Banksias at a seaside resort. Repeatedly it carried the provender we offered to a small patch of tea-tree, until we became speculative as to its ultimate destination. At a later meal the Yellow Robin not only brought along its mate, but enlisted our sympathies by producing *two* foster children. Realizing that such a report would be questioned, if not rejected, by the very wise, no mention was made of the extraordinary occurrence, until some time later, when a well-known ornithological journal recorded twin Cuckoos in New South Wales.

Seemingly, natural-history observations of an unusual character have a tendency to be repeated in sister States. The nest of a Silver-eye built into the flower of a *Hydrangea* collected in the Dandenong Ranges, and exhibited at a nature study class, might well have been the identical one figured in the above-mentioned journal, and photographed near Sydney.

The differences of opinion held by those to whom we look for advice, is yet another difficulty that besets the learner. Early one winter at a private sanctuary at Toolern Vale we counted five different Robins within a stone's throw of each other. The very well-known Scarlet; the Hooded on its favourite perch, a burnt stump; a Yellow Robin—visiting from a nearby gully; the Flame on a ploughed field just through the dividing fence; and the Red-capped which we had journeyed especially to see. The comments of two accredited authorities are worthy of note. One expressed grave doubts that we had seen the Red-capped, at all. The other, who knew the locality even better than we, wondered why we had missed the sixth, the Pink Robin, which he knew to be in the locality.

Many a sunny day in early spring has been spent in that sanctuary, and also in another nearby, in the hope of locating the nest of the Red-capped Robin actually in occupation; an old nest having whetted our desire. At Wyperfeld National Park one of these tiny sprites, that would fit comfortably into a breakfast egg-cup, put up a brave defence of its lichen-trimmed nest built on the fruits of a tree, when we dallied too long inspecting it.

Instances of the fearlessness of some birds are not rare, and most bird-lovers realize that with a little patience it is possible to gain the confidence of our feathered friends. The achievements of some of our camera-men in this regard is acknowledged. Some birds learn to frequent popular picnic spots, and even venture to alight on the bush tables in search of odds and ends of food. The persistence of the Wattle-birds was responsible for covers being

placed on the sugar bowls at the kiosk, in our own Botanic Gardens. Even so, some of these Honey-eaters are astute enough to know when visitors do not replace the covers, and the "knowing little bird that lives down at the bottom of the garden" whispers that the omission is not always due to carelessness.

The uncultivated trust of totally strange birds, in their wild state, is something rather different. By avoiding sudden movement we have had wildlings take food from an extended palm, after first encouraging them to come closer and yet closer. To watch the alertness, the instinctive caution, and the strategical movements of the bird is worth all the effort to keep perfectly still, until, without a pause in the wing-beats, the final little swoop is made and the morsel of cheese deftly lifted without the bird so much as touching the hand. Once at Frankston, when early *Acacias* bloomed and the hillside was gay with heath as if set for a bridal feast, a Spinebill fluttered for some seconds over my armful of gathered flowers, sipping nectar. Rare thrills, I grant you; but to re-visit the spot again is to stir a latent chord of memory.

We have had some amusing experiences in the course of time. At an excursion to Bulla, I decided that while the breeding of roses was intensely interesting, the opportunity to do a little bird-watching at this oasis on the plains should not be wasted. A male Rufous Whistler feeding a young one was discovered. During one of the foraging trips of the parent bird, the young one moved to a nearby shrub, disturbed, no doubt, by our too-ardent attentions. When the older bird returned to the original spot and found the youngster missing, he decided to employ his time of waiting profitably, also, by running through a few vocal exercises. Probably most of us in our youthful days have been reprimanded when dining with the family for speaking with a full mouth. But who amongst us ever achieved the questionable distinction of *singing* when thus handicapped? It was stated in a biographical sketch that the immortal Melba learned the secret of her inimitable trill from the Golden Whistler. If there be the merest vestige of truth in such a statement, surely it was the Rufous species that should receive the credit. Even those not particularly bird-minded have listened with amazement to its long-sustained note.

A most memorable occasion was the day when I first saw Regent Bower-birds in their native haunts, on the banks of the Maria River, north-eastern New South Wales. Our guide was a bare-footed, bare-headed unsophisticated youth, with a natural flair for observation. His craft had been new, two generations earlier, and the northern rivers are broad, and exceedingly wet-looking! Aided by the roots protruding from the river's banks, we landed, and cautiously made our way through the *Eugenias* and other fruiting trees, eagerly scanning the ground for fresh *débris* that would tell where the Bower-birds were feeding.

My companion remembered the stories of Red Indians that he

had enjoyed in his youth, for, with all our care, we could not prevent an occasional crackling noise as we stood on fallen twigs, whereas our guide passed through as silently as a Red-face. Silent of tongue also, he communicated his instructions to us by a look, or a slight movement of his hand, and to our credit we understood. At last we literally stole upon the birds. The fully matured males in bright orange and black proved as hard to distinguish as the females and immature males, but their natural curiosity drew them lower to investigate the three visitors to their domain, where intruders were few, indeed. Other birds were seen as we drifted on the river—colourful forms that were familiar to me only as illustrations, and as specimens in collections. Each provided a new thrill of interest. In retrospect, the highlights of that day were manifold; even the diversion of "playing Indians" was a not unwelcome episode in a life too full for the playing of games.

During the Christmas holidays, I was crossing a paddock near the Glenelg River when a pair of Red-capped Dotterels came into view, the female walking away in that silly, nonchalant way that is the surest sign in the world to the more experienced observer that she is over-concerned at the intruder's presence. For a day or so I approached the spot from a different point of the compass. Mostly, the male bird noticed me and had his mate trotting off, as before, so I matched their indifference with my own, knowing it to be a battle of wits—a battle that is often won by the bird! Quite by chance, I espied the little drab mother about to rise from her nesting spot. Mentally marking the spot and not daring to look either to left or right, I walked directly to it and so found the full clutch of two rather large eggs.

Several questions arise as to why the Dotterels chose to nest right in the middle of a paddock where at any moment stock might crush the precious eggs. To my mind there were numbers of more desirable nesting sites. Why did the pair desert the comparative safety and solitude of the ocean beach? Why not select a spot on one of the isolated sandbanks in the lower reaches of the river, instead of coming upstream for the best part of a mile? Or, if the paddock offered something not apparent to a mere human, why lay the eggs out in the open when there were heaps of stones, or the shelter of single stones, not to mention driftwood cast up by exceptionally high tides? There are none so wise that they can answer; to conjecture would be to invite a still larger series of questions; and yet, one of our leading zoologists assured me that I was wasting my time studying birds—there was nothing new to be learned about them!

For those attuned to hear, and to see, there are observations and experiences, any day, and every day. Nature has staged continuous performances of drama, comedy, and problem plays a-plenty, where all the performers rank as stars, but there is never a return season.

NOTES ON *HUMEA ELEGANS*

By Ivo C. HAMMET

The present is an opportune time for a few particulars of this beautiful native biennial, as it is in flower. A member of the Natural Order Compositae, *Humea elegans* is one of a small genus of half a dozen species found in Southern Australia. It is usually found in moist, shady situations, well sheltered from wind, but often appears to be equally at home on a rocky hillside.

Reproduction is very variable. Some years, seedlings appear in thousands; in other years, they are almost non-existent. Fertilization probably is caused by small insects which are attracted by strong scent and bright colour. For many years Germany was our principal source of supply for the seed of *H. elegans*, but lately our nurserymen seem to be responding to a better local demand.

The generic name, *Humea*, is in commemoration of Lady Hume; vide Paxton's *Botanical Dictionary*, which states: "*Humea*, Smith: In honour of the Lady of the late Sir Abraham Hume, Bart., of Wormleybury, Herts." However, many Australian botanists believe that the name commemorates Sir A. Hume, a botanical patron.

This plant was first described by Smith in his *Exotic Botany*, but it is mentioned, under various titles, by many of our early botanists. By the year 1800 it was widely known in England, where it quickly became a favourite greenhouse plant. Here in Australia, where it may be grown in the open, it deserves to be even more popular, and yet is very seldom seen growing in a cultivated state.

Its usefulness was never better demonstrated than in this present season of scorching winds and lack of rain, for *Humea elegans*,* with its "shining red, or copper-coloured" plumes, makes a blaze of colour which has defied the elements for five or six weeks, and no less attractive has been the beautiful scent emitted by this plant. On a calm night it may be detected a hundred yards away, and at times, it is almost overpowering.

Dr. G. Bennett, in his *Gatherings of a Naturalist*, written in 1860, in describing a boat journey up the River Nepean in New South Wales, states that he passed large clumps of *Humea*, which, on being bruised, emitted a delightful scent, which was sometimes so overpowering as to cause a headache. A contemporary, Lady Rockley, in her book on *Wild Flowers of the British Dominions*, was also impressed by the powerful scent of the *Humea*, which, when once smelt, will linger in the memory for years.

*van Meeuwen.

Plate XII



Plumie Humea (*Humea elegans*).



Humea elegans at Pipeclay Creek, Orbost. Shrub, about 10 feet in height, is on left, behind figure (Mr. Robbins).

A PLEA FOR GREATER INTEREST IN MINERALOGY

By T. B. DODDS

The science of mineralogy is probably the most neglected of those studies which are followed by the field observer. This is largely because the study of geology, of which mineralogy forms a part, is almost entirely neglected in schools. The observer usually takes up the study of plants or animals which are much more readily noticeable than the inanimate rocks upon which their existence depends.

Wherever one goes, one will see minerals. The great bulk of rocks, gravels, sands and soils are but aggregations of minerals, more or less consolidated. The beauties of nature which rely on rock colouring for their effects are produced by the various mixtures of minerals which have gone into the making up of the rocks. Nature's greatest colouring agents are the oxides of iron, limonite and hematite, which produce browns and reds respectively. These are both minerals and the sandstone they colour is probably composed of quartz, another mineral. Similar examples could be given *ad infinitum*, all of which would go to show what a large part minerals play in our existence.

The minerals in ordinary rocks, however, are in too finely divided a condition for the mineral collector. He leaves the study of such things to the petrologist with his microscope. He wants specimens of a respectable size to which simple tests can be made, if necessary, for purposes of identification, and which will make some kind of showing in his collection. When minerals occur in amounts sufficient to provide good specimens, they are often of commercial value. For this reason, the collector should keep his eyes open around mines and quarries which are the best hunting grounds.

One of the greatest inducements to the collector is the beauty of many of the minerals. The most spectacular minerals are probably those of the copper group with their vivid yellows, reds, blues and greens, but some of the other metalliferous minerals are not far behind nor are some of the constituent minerals of igneous rocks.

The true mineral collector has his endeavours bounded by the definition of a mineral. According to the great American authority, Edward S. Dana, "A mineral is a body produced by the processes of inorganic nature, having a definite chemical composition and, if formed under favourable conditions, a certain characteristic molecular structure which is exhibited in its crystalline form and other physical properties." In spite of the limits in this definition, there are more than 1200 distinct minerals, many of which have a number of varieties, but a great number of these are rare and occur in infinitesimal quantities. The novice collector will be

going for some time before he gets a hundred distinct minerals, unless he can do some extensive exchanging or purchasing.

The best specimens of minerals that can be obtained are crystals. Nearly all minerals, given the proper conditions at the time of their formation, occur as polyhedral solids bound by smooth faces. Each mineral has its own crystal formation and, at times, minerals which may be confused can be differentiated solely by the crystal formation. Usually, however, crystals are somewhat distorted and, if of any size, are seldom complete. The more intricate details of crystallography are very complicated, but such details are not necessary for the average collector.

One great advantage that minerals have over most things that are collected is that very few of them are liable to deteriorate even if not cared for with the utmost solicitude. A few are affected by moisture in the air and some occur at times in delicate forms, but most of them are very robust.

The novice collector does not need to know a great deal at the start, and a small amount of experience will allow him to identify a large number of the more common minerals at sight. Many others can be identified by making simple tests of the physical properties, others need simple chemical tests, and others, notably some of the rock-forming minerals, baffle all but the experts. One can go quite a long way and get a large amount of enjoyment if one makes the simpler tests only. These can be done in the field.

In any good book on mineralogy, each mineral is treated separately, and the physical properties peculiar to that mineral are set out along with other information. The first thing to be noticed is the crystal system, which, unfortunately, is usually not apparent, so you have to consider the form in which the mineral actually occurs. The colour and lustre are noted, the streak or colour of the mineral when powdered (in many minerals the colour of the powder is different from that of the mineral itself), and the formation of broken faces. Also to be considered are the specific gravity and the hardness. All this may sound very complicated, but, after a little practice, it will be found that most doubtful minerals of the more common varieties can be determined by investigating colour, streak, specific gravity and hardness. However, once you get thoroughly into this business you will want to do chemical tests.

The collector's outfit is simple. For field work, all that is needed is a collecting bag, a geologist's hammer (get a good one), a cold chisel, streak plate, and a knife. At home is needed a set of hardness minerals and some hydrochloric acid. The hardness minerals are: 1, Talc; 2, Gypsum; 3, Calcite; 4, Fluorite; 5, Apatite; 6, Orthoclase Felspar; 7, Quartz; 8, Topaz; 9, Corundum; 10, Diamond. All these are reasonably easy to get with the exception of apatite in place of which limonite, which is only

slightly harder, will serve. Any of these minerals will scratch those appearing before it. In the field a rough approximation can be made, one's finger-nail being about 2.5 and a knife-blade about 5.5. A streak plate is a bit of unglazed porcelain (a bit of rough white tile is good enough). A mineral scraped on this will leave a streak of its powder if its hardness is less than about 7. If it is harder its powder would almost certainly be white anyway. A little hydrochloric acid placed on a carbonate mineral such as calcite will effervesce and is a good test.

Victoria is, unfortunately, somewhat lacking in really spectacular minerals. Near Melbourne, there are good crystals of aragonite and zeolites to be found in some of the bluestone quarries and, at times, good crystals of calcite are found in the Lilydale limestone quarry. A number of mines in the Bendigo and Wood's Point districts produce fine crystals of quartz and ankerite. Quartz crystals, in fact, are liable to be found in almost any mine working on a quartz lode, and are well worth collecting for their beauty and diversity of termination and colour. There is a very nice micaceous hematite at Nowa Nowa.

The best mineral locality in Victoria is in the north-east where there are to be collected molybdenite, garnet, topaz, sapphire, tourmaline, jasper, agate, arsenopyrite, pyrite, sphalerite, barite, bismuth, wolfram, cassiterite, galena, fluorite, feldspar and others, many of them very nice specimens.

Mineral hunting has the same fascination as fossil hunting—you never know what you will find. It is always wise to investigate quarries—particularly bluestone quarries—and mine mullock tips, and you will almost always find that a mine or quarry manager will give you all the assistance he can if he knows that you are really interested.

It is with very deep regret that we record the death, on January 9, at the age of 52 years, of Mr. Albert Morris, of Broken Hill. With the late Dr. W. D. K. Macgillivray, he was instrumental in founding The Barrier Field Naturalists' Club, of which he was the Secretary from its inception. He was an acknowledged authority on xerophytic vegetation, not only Australian, but that of other lands as well. He was always willing to place at the disposal of visiting and local botanists, professional and students, his vast knowledge of the local flora, as well as his own native garden and herbarium. He raised from seed thousands of native trees and shrubs, and these have been planted in various places around Broken Hill as a means of combating the dangers of wind erosion. 10

A lasting monument to the naturalist's memory is the Albert Morris Park at Broken Hill, which has been planted chiefly with trees and shrubs which he himself had raised. To his widow we extend our deepest sympathy.

L.W.C.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, February 13, 1939. The President, Mr. R. H. Croll, presided and about 100 members and friends attended. The President extended a hearty welcome to Mr. and Mrs. E. S. Hanks, and to Mr. A. H. Chisholm, C.F.A.O.V., who had just returned from abroad.

An illustrated lecture, "Birds and the Bush," was given by Mr. C. E. Bryant (editor *The Emu*). A comprehensive series of lantern slides was shown, the lecturer making a running commentary on them.

The President expressed the thanks of members to Mr. Bryant.

CORRESPONDENCE

From Mr. J. Searle, thanking the Club for its letter of sympathy to him in his recent illness, and stating he was making good progress. Mr. Searle has made several suggestions regarding a Biological Survey of Port Phillip Bay and the Club hopes to further this scheme. Members interested are asked to advise the Secretary.

From Miss Jean Galbraith, stating that a report of the death of a Club member, Mr. Henry Morgan, in the bush fires, was incorrect. Mr. Morgan was in Bairnsdale Hospital, and making progress towards recovery.

From Miss J. W. Raff, reporting on the Canberra meeting of the Australian and New Zealand Association for the Advancement of Science.

From Mr. F. Morley, State School 3408, Breakaway Creek via Condah, stating that he would be pleased to see any members who might be passing through his district.

From Brown, Prior, Anderson Pty. Ltd; letter of apology for the late delivery of the *Naturalist* this month.

From Fisheries and Game Department, stating that it was investigating the recent reports of Koala shooting on Phillip Island, and asking for any evidence, in confidence, that would assist the inspectors.

Sundry letters with reference to the Club's action in protesting against grazing at Mt. Buffalo National Park, and promising support for deputations, etc.

Mr. A. B. P. Underwood gave Notice of Motion, that he would ask this question at the next meeting of the Club: "Why should we not seek a poll tax on cats?"

REPORTS OF EXCURSIONS

Sydenham, Organ Pipes, held over until next meeting: Dog Rocks, Mr. F. S. Colliver; Cheltenham, Miss Wigan

QUESTIONS BY MEMBERS

The following questions were dealt with:

What is the average life of the Stone Curlew? Answer—No information for natural life, but has lived 50 years in captivity.

Why is the Pilot-bird so named? Answer—Because of its association with Lyre-birds.

Does the Pilot-bird associate with other birds? Answer—No association known, possibly would with the Mountain Thrush. (Mr. A. H. Chisholm.)

What is a Dugong? Answer—An aquatic mammal that suckles its young. (Mr. Crosbie Morrison.)

What is a Wallaroo? Answer—One of the Kangaroo family, about halfway in size between the Kangaroo and the Wallaby. (Mr. Crosbie Morrison.)

When did the Musk first lose its scent? Answer—Between 1910-1912. (Mr. E. E. Pescott.)

EXHIBITS

Miss A. Cornish.—Calc segregation around tea-tree roots, Cowfish, sea-squirts and shells, from Summerlea, Phillip Island.

Mrs. M. E. Freame.—Heart Urchin, Brittle Star and Ascidians.

Mr. C. French.—Living Rock (*Ariocarpus fissuratus*), from Mexico; also Couch-grass growing through thick stem of succulent (*Aeonium*).

Mr. H. T. Reeves.—Coloured photographs of Australian plants.

Mr. V. H. Miller.—*Humea elegans* (pot-grown); Orchids—*Cypripedium hirsutissimum*, and *C. callosum*. Also shells, from Discovery Bay.

Mr. S. R. Mitchell.—Series of minerals to illustrate paper in last issue of *Naturalist*.

Mr. T. Dodds.—Various petrified wood specimens.

Mr. T. P. B. Wilks.—*Clonanthus Dampieri* (Sturt's Desert Pea), grown at Caulfield.

Plate XIII



St. Bernard Hospice in the early 1900's



Photos: C. B. F. Johns.

Mt. St. Bernard and the Road to the Hospice

ST. BERNARD HOSPICE—"THE OLD HOUSE BY THE SIDE OF THE ROAD"

By A. J. TADGELL

Many Field Naturalists' Club members of the older generation have sung, with S. W. Foss, "Let me live in a house by the side of the road, where the race of men go by, the men who are good, the men who are bad, as good and as bad as I."

Let me live in a house by the side of the road, and be a friend of man.

Those of us, who, when staying at the Hospice, have read carefully the visitors' books, have noticed names of men to whom the natural history societies owe much and, incidentally, to whom the whole State is deeply indebted. The recent disastrous bush fires took toll even of historical places and among them, one of the oldest hostelrys of Victoria. So that even a bush fire may be epoch-making.

I have asked myself, more than once, whether the Historical Society of Victoria was able to preserve the records and books of this once famous wayside public house, and so the names of eminent travellers, who had, perforce, to stay there, as that was the journey's end for a night, with the coach resuming its journey at 6 a.m. from Bright to Omeo, over the famed Alpine Road, the highest then in Australia. Omeo was a name to be conjured with. Commercial travellers and "knights of the road," like my brother found nothing between Harrierville and Omeo, though big business was waiting them at Omeo and mining towns that had sprung up incidental to the finding of gold in these out-of-the-way Alpine districts. Diggings might be suspended for months when snow lay thickly on the ground all round. Only Alpine postmen ventured on skis once the road was closed to traffic, and the icy wastes were only crossed in midwinter at great personal risk to the chance traveller.

Many lost their way when tracks became obliterated and the wrong turning was made easy for the stranger. At Harrierville, on one of our trips, Mr. Favare, besides singing for us a good song, regaled us with many stories of his experiences when carrying the weekly mail on his shoulders and good skis. Of his following in the snowy highlands, straying footsteps of those, who, without his timely help, might have never been found alive again. One young man set off from the Hospice to cross Hotham on his bicycle, but found the snow hard going and abandoned his machine. He was subsequently found in a dilapidated stockman's hut in a deep gorge of the Kiewa, under Mt. Hotham, after giving up hope of rescue. A note on the table was written in his own blood to his relatives.

I have sometimes wondered how I first became so interested in our Alps and why St. Bernard, Hotham, Feathertop, Bogong, became so much more than the names they are to so many Victorians who have indeed heard of Mt. Buffalo, but know nothing of the glories beyond, in our Alpine regions. Did I first discover them by reading of the Science Congress gathering under Baron Von Mueller, at Mt. Hotham, in the year 1890? I know that the reading of an article by James Stirling in the *Proceedings of the Geographical Society of Victoria*, describing an outing, and the botanical paper recording the flora, inspired me with the hope of a visit to our Alps.

Mt. St. Bernard and its hospice are situated almost where the Owens River rises, at the foot of that Mount and Mt Smythe, so much like a lion couchant in its rugged grandeur. The valley of the Owens is like an inverted V, each side of the V representing the steep mountains leading up to Hotham from Harrietteville, with the Hospice at the inner angle of the letter.

Pleasant memories I have of the walk of fourteen miles in the sweet scent of the glorious forest of *Eucalyptus* (*Sieberiana*), midway; and, on reaching the Hospice, of the *Errostemon* so widely grown in our gardens and known to botanists as *E. myoporoides*, and to seedsmen as *E. nerofolium*. Notice the thickness of the leaves and size of flowers in the Alpine native. I have described the walk in *The Naturalist* (Vol. 38, Feb., 1922), as well as the places worth visiting nearby, with their distances. As one proceeds one voluntarily pauses to exclaim in delight; and reaching the hostelry and looking down the valley so overgrown that one rarely catches a view of the rushing stream, one is breathless, for the vista is indescribable. Such another view is gained when looking up this deep valley from one point only on the Harrietteville-Feathertop track as one peers through the trees till finally the Hospice is seen perched nyrie-like at 5,500 feet above sea level. In a walk it takes a long time to reach.

How often has one expressed the hope that some day a chalet might be erected on Mt. St. Bernard, worthy of its position which many regard as superior to the Buffalo. The destruction of the old Hospice by bush fires has at last given the opportunity to private enterprise that has been lost to Government enterprise. We are not disappointed at this, and hope for the success of the venture.

Winter sports had not come into existence when I first visited the Hospice, though Mr Tobias, the local postmaster, and a few kindred spirits, were endeavouring to foster our interest in skiing—a new form of winter snow-sports—that had not taken hold of the public imagination. Since the earlier years of the 1900's, Victoria has learned much of this sport, which has extended to

Mt. Feathertop, the Bogong High Plains, and Mt. Bogong itself.

Again I think of the names in the visitors' books of the old Hospice, and of its original proprietor, Mr. Boustead, the first to record the meteorological observations at our Alpine Heights; observations that were the forerunner of the many years of records necessary for the electric system from the waters of the Bogong High Plains. Among names in the books are those of Baron Von Mueller, Messrs. Stirling, Maiden, Walter, French, Sutton, Barnard, Macdonald and others, unforgettable in our own Field Naturalists' Club and other scientific societies. But the old home known to so many of us as "Boustead's" has gone, and we wonder whether there will be a "hole in the roof," so like a great chimney from the distance; whether it will still be necessary to have three blankets to keep one warm at night, even in summer. We recall the fun when a lady visitor to the old Hospice told her story in the morning of her experience in trying to sleep, the wind rustling the loose hessian and thick paper of walls and ceiling, the mice running over her head or down the walls, and the "plomp" of the fat spider as it reached the floor. In terror she lay awake all night, watching for the blessed daylight to end her fears.

Perhaps, with the advent of the motor car, access will be easier; but will not a deal of the charm that inaccessibility gives, be lost when more people may go and enjoy that which is difficult or hard to reach?

A former member of Parliament was rather disgusted at our Alpine flowers which he regarded as uninteresting and not beautiful when he compared them with those of the Swiss Alps. Our Alpine roads were—well, I shall not attempt his description; but I smiled at his dismay and it did not daunt me from visiting these out-of-the-way places, nor cause me to give up my alpine wanderlust.

EXHIBITION OF FLOWER PICTURES

At the Kodak Gallery, Melbourne, on March 30, at 3 p.m., the President of the Field Naturalists' Club (Mr. R. H. Croll), will open an exhibition of Mr. H. L. Reeves' photographs of Australian wildflowers. This unique display will include 150 coloured enlargements from Mr. Reeves' negatives. Each of the Commonwealth States will be represented. Most of the plants will be species that can be successfully cultivated. A catalogue, giving the botanical and common names of the plants is being printed at the cost of the Kodak Company, and will be distributed to visitors. Admission is free, and the exhibition will be open for two weeks. Mr. Reeves' photographs are unique, and all are beautiful.

THE AUSTRALIAN LABYRINTH SPIDER

By L. S. G. BUTLER.

[The "spider hunt" on Saturday, February 4, 1939, at Cheltenham, under the leadership of Mr. L. S. G. Butler, was attended by eight members and friends who were taken to the scrubby fields opposite the Melbourne Benevolent Home, about one mile and a half to the east of the railway station. Mr. Butler has very kindly supplemented his report of the excursion with an account of a very remarkable spider.—Ed.]

In normal times these Cheltenham paddocks are teeming with insect and spider life, but owing to the present dry season, both spiders and insects were exceptionally scarce. This convenient and prolific collecting ground is covered, among other vegetation, with low-growing shrubs of the Scrubby Sheoak, *Casuarina*: the dwarf form of Silver Banksia; and the Silky Tea tree *Leptospermum*. Home builders, and sand-pits have cleaned out acres of this ground and in the near future collectors will need to seek fresh pastures.

The few specimens collected proved to be very interesting. The spider which was given the most attention was *Corasoides australis* Butler (*Proc. Roy. Soc. Vic.*, Vol. XLII, Pt. 1, New Series, p. 42). This is the Australian Labyrinth Spider, a small but active species about one half-inch in length. Interest centres in its spinning work. The webs are not very plentiful, but can be found by searching carefully at a position close to the ground, between a selected opening among the bushes.

The upper portion of the labyrinth is of fine guy ropes, and below is a delicate sheet parallel to the ground. This sheet at one end folds over and joins to form a tapered funnel leading to a tube sloping downwards to the burrow. The whole structure occupies a space of about fifteen inches by twelve inches. The web is delicately and strongly constructed, and is free from any debris, such as leaves, or any other rubbish, except where the silken tube enters the burrow in the sandy ground. Here, attached to the outer surface of the tubular retreat, are grains of sand and other foreign matter.

The upper guy ropes are attached to leaves and branches of the low-growing shrubs. These are the snares to trap, or rather, retard insects on their flight. They are spun at all or any angle without any order of position or direction, and this jumbled confusion is a real labyrinth to an insect on the wing. The mass is quite open and easy of access, but a continuation of flight inside this maze of ropes would surely crash the insect into the net below.

This net, brings to mind the net of the trapeze artist. How often have we seen the performer fall safely into the net below. Likewise the intruding insect's fall is caught safely by the silken net, placed so conveniently below the snare. But the insect's

security is brief; for at the end of the net, in the funnel, lurks the weaver, who unerringly, and with lightning speed, pounces upon its prey. The fangs rise, and in an instant the deadly poison is injected. Death comes swiftly, and the spider, seizing its victim carries it below to enjoy a succulent meal by imbibing its life's blood.

Corasoides belongs to the family Agelenidae, whose members are noted for their skill in weaving sheet-webs. Their webs seldom have a pattern, but are of an all-over, any way, weave. Not so that of our weaver, which is more like the circus net in weave; an open, somewhat square mesh, very delicately and beautifully woven. At the end, where the burrow is situated, the net folds over to form a tapered funnel which eventually forms the tubular retreat, sloping to the ground, and continues on as the silk lining to the burrow. Here again, the tubular retreat is a positive weave, not an all-over uneven design, but a somewhat square muslin pattern which thickens as it reaches the ground.

At our very doors, Victoria offers one of the finest examples of the craftsmanship of the spider. First of all, the maze of guy ropes constructed for snaring, the net below, the tapered funnel continuing on and forming the tubular retreat; and then the burrow. But its weaving skill does not end here. After mating, our industrious worker enlarges a small nursery at the side of the burrow. In this recess, seldom more than four inches or five inches in depth, two, sometimes three, spherical silken egg-bags are manufactured. The egg-bags are carefully guarded until the spiderlings are hatched; but whether the young stay for any time in the maternal home, or migrate early, has yet to be discovered.

Corasoides is just a plain ordinary spider. It is not adorned with satin or beautifully coloured bands, as are many species that live adjacent to its web; but all the same, a specimen was captured and brought away from Cheltenham. Its new home was a glass test tube lying on a shelf. Away from its web, the spider seemed devoid of any special interest; but it was soon at home guarding its two egg-bags. On the second evening in its new location, it started to weave a third egg-bag. When this work was first noticed *Corasoides* was hanging upside down with the egg-bag in the early stage of its formation. The bag was of the ordinary spherical shape, with a small but strong connecting strand of silk anchoring it to the ceiling of the tube. The bag, being held in the spider's "lap," was easily rotated and twisted by means of its owner's legs and at the same time the spinneretts were hard at work building up these threads into a stout silken covering. Many spiders leave their egg-bags attached to the silken walls of their tubular retreats, but the Labyrinth Spider dispenses with this temporary anchorage when the egg-bags are completed.

Spiders lay their eggs in a mass, kept together by a glutinous substance and when dry they are free and apart. If our species always constructs the egg-bag in the manner described, and the eggs are laid into its lap when in an inverted position; the legs could then take up this mass of eggs and cover it with silk.

But to return to the egg-bag under observation. Alas, it was empty! It was a stupid piece of work. An empty egg-bag! The builder could hardly be credited with a spark of intelligence. Yet away from its natural environment, it may have been away from its normal intelligence. Casting our thoughts back to its superb



Photo. by L. S. G. Butler.

Corasoides australis guarding its egg-bags.

spinning-work in the field, it can hardly be realised that it builds its snare and retreat by heredity or instinctive craftsmanship devoid of any reasoning.

Three other egg-bags were collected from another burrow, and on examination, they proved to be worthy of notice. In construction the egg-bags of *Corasoides* may possibly be different from any others on record. There is the ordinary bag in the centre, a heavy padding of earth, and then a thin outer silk covering. The inner bag is pure white silk. A thick, tough bag is made, comparable to the finished product of the ordinary type. It is surrounded by a heavy layer of earth and sand grains, with an odd strand or two of silk among it.

The outer covering is only a frail one in comparison with the inner bag.

About thirty-five is the average number of eggs in each bag; they are protected by a soft downy padding of silk, while the external part of this inner bag is smooth and tough. The bag complete, measures seven-sixteenths of an inch in diameter; the white bag, about one quarter of an inch.

One egg-bag was cut open and the spiderlings came out in a few seconds. They were immediately busy and active, spinning odd strands of silk here, there, and everywhere; taking only a second to learn how to spin, how to run at an amazing speed, and how to kill their companions. An amazing feat for the first few seconds of their life.

Next to come under our notice at Cheltenham was the web of *Miturga* sp? Its web is a mass of silk among the grass, under stones, tins, or other rubbish. When protected in this manner, the silk is fairly clean especially when the web is torn apart, when a voluminous mass of heavy-layered pure white silk is revealed. The spider and her egg-bags were found. This fairly active spider is about three-quarters of an inch in length, and of a fawnish grey hue, abdomen marked with a pattern.

An old method, still supposed to be in vogue among the ignorant, of staunching bleeding, is to wrap a spider's web around the wound or cut. If it be true that this is still done, let it be hoped that a web similar to *Miturga's* beautiful clean mass of white silk is used in preference to the average dirty and unhygienic web.

Many old tins contained dozens of webs of *Latrodectus hasselti*, the poisonous red-backed spider, but the spider itself was not seen. Numerous burrows of spiders were noticed and two were dug out. The best manner to tackle this job is, first to place a flexible twig or straw in the burrow, making sure that it is well down and leave it there while digging. At a position a few inches away from the burrow, dig a trench and into it excavate the intervening earth, following the hole down by the guiding twig or straw. By this means the trap-door spider, *Anume grisea*, was found. Anatomically this spider is a true trap-door species but it never builds a door or lid to the entrance to its retreat. The spider was caught in a glass tube, and the main characteristics of its family were noted. First, the fangs, which do not meet pincer-like, and secondly, the two pairs of light coloured patches on the abdomen. If two pairs of these book-lungs are visible, the spider is sure to belong in this group. Only one ordinary, or rather, true spider has two pairs of book-lungs, and that is a rare Tasmanian form.

A few specimens of the Red-and-black Spider, *Nicodamus bicolor*, were collected. This species is well under a quarter of an inch in length, but its colour scheme is distinctive. Originally found at Macedon; Cheltenham and San Remo are new localities for *Nicodamus*.

FLOWER AND FEATHER AT MOUNT BUFFALO

By H. C. E. STEWART

A seventeen-day stay at the Mount Buffalo National Park during the Christmas-New Year holidays afforded opportunity for comparison with botanical observations made on previous visits. The holiday period coincides with the apex of the spring blossoming season which in alpine localities usually begins late in November and extends till about the end of January. An abnormally dry year, continued through December and into the beginning of January with unusually high temperatures, made the present visit to the Plateau of exceptional interest. Notes were taken on the manner certain species of the unique Buffalo alpine flora reacted to the phenomenal heat conditions. Observations that have appeared in *The Victorian Naturalist*, together with several years' experience of the locality have also now established that certain changes have taken place and are likely to still further occur.

Younger botanists might be informed at the outset that the first recorded visit by a naturalist to the mountain was in 1853, when Baron Sir Ferdinand von Mueller, shortly after arrival in Victoria, embarked on his first expedition into the bush. The record reads that Baron von Mueller, in company with Mr. John Dallachy, Superintendent of the Melbourne Gardens, traversed the Buffalo ranges, and so made initial contact with the Victorian alpine vegetation.¹ He was the first to ascend the Horn (5,645-feet), then known as Mount Aberdeen. The historic journey is commemorated by the nomenclature of the many new plants discovered, among them the now familiar Buffalo species such as *Kunzea Muellerei*, *Acacia Dallachiana*, *Trichymene Billardieri*, *Helichrysum Stirlingii*, *Grevillea Victoria*, etc.

Perhaps the most spectacular of native flowers common to the Buffalo is the Mountain Shaggy-pea (*Oxylobium alpestre*), often more appropriately termed "Wallflower-pea." During Christmas week, this resplendent orange and reddish-brown legume was at its gayest, and seemed to revel in the dry warm weather. With the advent of increased temperatures the pea exhibited a characteristic of many legumes in times of drought; it shortened the blossoming period and quickly ran to seed in the urge to perpetuate the species. On a warm day the rhythmic popping of pods could be heard as they split, to scatter seeds on the forest floor.

The Buffalo is the particular habitat of the rare Blotchy Mint-bush (*Prostanthera Walteri*), originally discovered near the Gorge in 1903 by Dr. C. S. Sutton and Mr. F. G. A. Barnard.² How little known this Mint-bush seems to be among those interested in Australian plants! At the Chalet the official guide and Railways escorting officers invariably point this flower out to visitors as



FIG. 1. H. P. 1. 1939

Hesperaloe parviflora (Lam.) Engelm. Exsiccata

"Monkey Mint." The deep olive foliage and curiously veined greyish-green flowers, and the absence of any "minty" aroma, differentiate the species from other *Prostantheras*. A past record indicates that the plant "grew in great profusion around the Gorge."³ But no mention is made of its existence in other directions. Apparently the shrub has spread, for it can be noted fringing the road to Lake Catani, also at the Horn, and even extends to the North Buffalo, where it thrives on the eastern slope of Mount Macleod. A very exuberant growth occurs on the track to the Galleries, close by the huge rock known as "The Pebble." Of all the shrubs on the Plateau, *P. Walteri* is the least variable in bloom and can always be depended on to flower throughout December and January. Cuttings readily strike into growth in Melbourne, but the plant cannot thrive away from its natural setting of tumbled granite boulders. At one time the plant could be seen in the Melbourne Botanic Gardens. One wonders how Baron von Mueller missed collecting it on his expedition. Presumably it was very rare in 1853.

The Buffalo flora falls into two sharply contrasted groups—the high mountain species comprising the forest with the undergrowth, and the alpine species of a dwarf tundra vegetation occupying the open grassy plains of the Plateau. Among the second type, the most distinguished this year is the Alpine Everlasting (*Helichrysum lepidophyllum*). It is impervious to extreme climatic conditions, provided it is allowed to abide in the pulverised granite at the sides of the main road to the Chalet. Of robust substance too, this year, is another tundra example, the vivid purple Mountain Milkwort (*Bredemeyera retusum*), at home in the dense tufts of tussock-grass.

A rival in loveliness to its cousin the Grampians *Thryptomene*, the Mountain Heath-myrtle (*Baeckea Gunniana*), appears best in quality and profusion under sunny conditions and a rarefied atmosphere. A lover of open spaces, *B. Gunniana* prefers its roots in the peaty tundra soil.

The Mountain Plum-pine (*Podocarpus alpina*) ranks an important forest species, and is interesting as the only Podocarp listed in Victorian flora. A relic of an ancient vegetation that probably covered the considerably higher elevations of the Buffalo before erosion to present levels, its existence is limited to but a few places, principally in the ravine formed below the Lake Catani weir. A somewhat unnecessary and decidedly unpicturesque track lately made below the weir has cut through several adult examples of the pine. Other specimens have been ruthlessly pruned to prevent a too close proximity to the wooden supports of the bridge that spans the ravine. *P. alpina* may be dying out, as no young plants can be located. This year female fruiting bodies were discerned,

but no male fruits. Particular efforts to preserve the pine in the Park seem very desirable.

The "high majestic Royal Grevillea" of Baron von Mueller, named "*Grevillea Victoria*" in honour of Queen Victoria, unfortunately has received many set-backs. With other Proteads, such as the Alpine Grevillea (*Grevillea australis*), and the Alpine Orites (*Orites lancifolia*) which are found only in isolated situations, it evidences diminishing vigour of growth. The Small-flower Grevillea (*Grevillea parviflora*), however, still remains plentiful. The *Proteaceæ* group of plants suffer by contact with man, and appear to possess less regenerative powers than *Myrtaceæ* or *Compositæ* orders.

Comparison with a present list compiled of about 250 species found on the Plateau between elevations of 4,000 to 5,600 feet reveal that some species have disappeared. *Astelia alpina*, *Acacia Walteri*, and *Correa Laurenciana* are no longer present. Several of the orchids, the Common Bird-orchid (*Chiloglottis Gummii*) is one, formerly abounded, but are now scarce and seen only in odd spots. But other rarer orchids have arisen, notably the Elbow Orchid (*Spiculæa Huntiana*) and the Bogong Leek-orchid (*Prasophyllum alpinum*, syn. *P. Tadgellianum*). The dry season adversely affected all the Buffalo orchids. Two only were located; a few spikes of the Veined Sun-orchid and a solitary Potato-orchid. These should appear abundantly in future good seasons.

Of the major types of trees, particularly the eucalypts, fire and axe have taken toll, whilst the cow once more becomes the enemy of much of the dwarf growth, now grazing leases in the Park have been revived. After fire, the severe winter conditions render recovery of the forest areas very slow, and the absence of humus in the granite interstices through fire further retards growth. A record heat on one day for the Plateau, 86 deg. F., caused many juvenile eucalypts visibly to wilt. Though small fires have occurred during the year 1938, the mountain has happily escaped the conflagrations that have swept vast expanses of the North East. Where former growth has been denuded and regeneration is taking place, it is satisfactory to discover practically no alien plants obtaining a hold.

As ornithological records of the Buffalo are very sparse, some observations in this respect may be of interest. The bush fires in the adjacent countryside have obviously caused very definite movements of bird life to the sanctuary and splendid water conservation on the mountain. When in company with Mr. G. O. Faulkner, a birdlover from U.S.A., seven birds new to the locality were positively identified.

Near the Chalet a Bronzewing Pigeon made a home and was seen several times feeding on fruits of the Daphne Heath

PLATE XV



Dr. G. H. S. Jones

Pterocarya Walteri ("Blotchy Mint Bush")

(*Brachyloma daphnoides*) or on titbits left outside by friendly occupants of an adjacent workman's camp. One morning near the stables a pair of Black-faced Cuckoo-Shrikes were followed from tree to tree until lost to view. As they were not seen again, they were assumed casual visitors. Mr. Fred Chalwell of the Chaler staff stated that the birds were new to him. An engaging company of Striated Thornbills were frequently seen in saplings towards Bent's Lookout, and appear to have displaced the Yellow-tailed and Buff-tailed Thornbills, once very plentiful. Silvereyes, new arrivals, were observed diligently seeking species of grubs enclosed in flat cocoons on eucalyptus foliage. The number of grubs consumed in a brief time was impressive.

The Lake provided two new birds. One, the Little Cormorant, was possibly attracted by fish. The other, a Swamp-harrier, was observed from a car to swoop down and fly up with prey. Stopping the car, we frightened the bird into disengaging its victim, which turned out to be a White-eared Honeyeater. Badly mauled, it was eventually able to struggle to cover. Mr F. Chalwell volunteered the information that Swamp-harriers were common in the valleys. At the Horn, the same afternoon, a trio of Nankeen Kestrels was surprised reconnoitring on the granite near the summit (5,645 feet), which is understood to be an unusual height for this bird. Presumably they were investigating food values of the Bogong moth in the crevices.

Many birds reported on previous excursions were again in evidence. A highlight was the extraordinary number of Pilot-birds in residence. A first glimpse of one was caught at the spot where their presence was noted by Mrs V. H. Miller two years ago.⁴ Standing on the bridge below Lake Catani, they could be seen or heard in the bushes and rocks beneath. Another convenient point of vantage was the bridge crossing the Crystal Brook above where it falls into the Gorge. The Pilot-birds here were remarkably amenable to observation. Only a brief interval of quiet waiting was required, when they would flit in and out of the undergrowth and rocks, and intermittently hop down to drink. Occasionally, here they were seen in association with Grey Fantails.

Though the eumlypts had not commenced to flower, the bush was choral with the notes of honeyeaters, and all five species listed for the mountain were identified. A short halt at a Bottle-brush (*Callistemon pallidus*) in flower always found a Honeyeater busy. The Lyre-bird, too, is still in evidence. A male was watched for some minutes on a log in a burnt out area below Torpedo Rock, and several times the sound of Menura mimicry came floating up from lower down the mountain. A well-known haunt of the Lyre-bird is the gully formed by the streamlet flowing into the Haunted Gorge, and in this vicinity new mounds had been scraped up since

last year. One occasion at midday a bird chimed its way down this particular stream, accompanied by the distinctive notes of Pilot-birds in its wake. The manager of the Chalet has a melancholy exhibit of the complete tail feathers of a Lyre-bird thought to be slain by a wild domestic cat. Two or three of the pests had been shot, and others were seen slinking among the stacks of firewood at the rear of the Chalet.

The Black Ducks on the lake now number sixteen and by their disposition when disturbed appear to be two broods. Normally a feature, Wattle-birds have become practically non-existent this year. The Red Wattle-bird was seen but once, alternately visiting the Bottle-brush for nectar and the Daphne Heath for fruit. Its absence is mystifying. The Little Wattle-bird has also unaccountably disappeared, temporarily, it is hoped.

For three successive late afternoons Swifts were noted flying low from the Chalet verandah. The manager of the Chalet said it was a new sight for him.

References:

1. *Baron Sir Ferdinand von Mueller*—Reprint of Memoir, by Chas. Daley, p. 9.
2. *The Victorian Naturalist*, Vol. XIX, p. 156.
3. *The Victorian Naturalist*, Vol. XX, p. 154.
4. *The Victorian Naturalist*, Vol. LI, p. 187.

THE VISION OF ANIMALS

By KEVIN O'DAY

The importance of sight to its possessor varies greatly throughout the animal kingdom. It is to be expected that those varieties active in the bright light of day will be possessed of acute vision. Those which hunt or feed at night or in the twilight will have visual organs very sensitive to light and to small variations of illumination, that is, they will be able to perceive an object when it moves by the variation of light and shadow, but will be unable to distinguish small details, and since light is essential for the perception of colour, will be colour-blind. It is a strange fact that the mammal, the highest expression of life amongst animals, is, with the exception of man, some of the apes and the marmoset, the possessor of a very low standard of visual acuity. As optical instruments their eyes are not to be compared with those of the majority of birds and reptiles. This is to be explained by the fact

that most mammals in their native state are nocturnal or crepuscular in their habits, whilst most reptiles and birds are diurnal.

The careful examination of the eye will give much valuable information to the field naturalist and add to the fascination of his hobby. The nocturnal animal, in its anxiety to collect as much of the dim light as possible, possesses a large visual organ in proportion to the size of the body. The cornea or clear part of the outer covering is very large and the lens tends to be spherical and highly-refracting. The retina, the sensitive membrane at the back of the eye, develops a substance—the visual purple, which renders it acutely sensitive to small quantities of light. Such an animal is at a great disadvantage in bright daylight, even more so than we when we come from the dark picture theatre to the brilliant sunshine outside. To protect the delicate retina from harm the pupil contracts to a narrow slit and shuts off the light. Hence we can say at once that an animal with relatively large and bright eyes and a slit-like pupil is certain to be nocturnal in its habits. The converse is not always true, especially amongst the higher mammals and the birds.

Most birds are diurnal, with very acute vision and eyes truly enormous in comparison with the size of the head. All nocturnal birds have round pupils at all times. We can gain some support for our thesis by observing that the cornea is small in comparison with the total size of the eye. Among the lizards we gain our greatest support and can say definitely that any specimen with a vertically slit-like pupil, is nocturnal or crepuscular in habit. Most marsupials that I have examined have slit-like pupils. Strange to say, the usual descriptive works on these animals neglect this feature of the eye, excepting the Koala. It is obvious even in diffused daylight with the very nocturnal Ring-tailed and Bushy-tailed or mountain Opossums, and in bright sunlight with the Native-cat and the Wombat.

With the exception of man, some of the higher apes, and owls, the visual axes of most animals diverge to a greater or less degree. Man judges distance largely from the slight difference in the images presented by each eye to the brain. It is unlikely that this occurs in the lower animals yet we must not deny to the bird extreme accuracy in the judgment of distance. I was much impressed on one occasion by a sleepy Kookaburra perched on a telephone wire, who suddenly plunged straight at a worm in the grass twenty feet below; a feat demanding a high degree of visual acuity as well as a very delicate perception of distance. Strange to say, one snake, *Dryophis*, with horizontal "key-hole" pupils and a narrow snout, is accredited with binocular vision, and is famed for the rapidity and accuracy with which it strikes.

Most reptiles are diurnal. Some of the Australian species are nocturnal or crepuscular; in particular, among lizards, the geckoes and limbless lizards; among snakes, the pythons and some of the Colubrids. The snake is famous above all, for its glassy, unwinking stare. Geckoes and the limbless lizards share this feature with snakes, as do some of the degenerate skinks which are probably nocturnal in habit. This interesting circumstance has given rise to a theory to explain the presence of permanently closed and transparent lower eyelids in these reptiles, which gives them the unwinking stare. The animal, burrowing and creeping along rough surfaces in the dark, was continually exposing its eyes to damage. The eyelid became permanently closed and transparent as a protection. It is insensitive, and is cast with the skin. All the snakes have descended from nocturnal ancestors, and, although many have developed diurnal habits again, they have retained the closed eyelids.

The size of the eye in the gecko and the limbless lizard is deceptive. The colour of the iris matches closely that of the skin, and with the pupil closed the eye merges almost imperceptibly into the remainder of the head. Although the gecko has eyes well adapted for dim illumination, it will lurk in the shadow and dash out into the sunshine to capture a fly. It is probably aided in this by the peculiar structure of the iris—the membrane which surrounds and forms the pupil. As a rule, the margin of the pupil, be it circular or slit-shaped, is quite regular, and the margins of the slit come together but do not overlap. The gecko's pupil, however, has three or four regularly curved notches along each side of the slit. Fully dilated, the pupil is circular. When a bright light is thrown on it, it contracts so that one notched edge slides over the other, leaving three or four tiny holes where the notches are, protecting the retina from glare and permitting to enter enough light for the purpose of the hunter—a most ingenious mechanism.

For some years the writer has been investigating the finer structure of the eyes of Australian reptiles. At present he is particularly interested in the limbless lizards, and the degenerate skinks with snake-like eyes. He would welcome live specimens collected by any member of the Field Naturalists' Club.

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THE FIELD NATURALISTS' CLUB OF VICTORIA

The ordinary meeting of the Club was held at the Royal Society's Hall on Monday, March 13, 1939. The President, Mr. R. H. Croll, presided, and about 100 members and friends attended.

The President spoke of the passing of two members, Mr. Albert Morris, of Broken Hill, and Mr. Edwin Cox, of Surrey Hills. Members stood in silence as a mark of respect.

LECTURE ON THE LOWAN

The subject for the evening was an illustrated lecture on "The Lowan, Its Breeding Habits and Life History," by Mr. F. Lewis, Chief Inspector of Fisheries and Game. Numerous lantern slides were shown and information gained in recent research on the birds by Mr. Lewis was given.

The President expressed the thanks of the Club to Mr. Lewis, and invited discussion on the subject. This was contributed to by Messrs. A. H. Mattingley, A. H. Chisholm and W. H. Ingram. Mr. Lewis answered several questions.

CAT TAX PROPOSED

Notice of motion from the last meeting. Mr. Underwood moved "That a nominal tax be placed on cats, similar to that on dogs." This was seconded by Mr. A. H. Mattingley.

Mr. Crosbie Morrison moved, as an amendment, "That cats be declared vermin under the Vermin Act, except when under the control of the owner." Seconded by Mr. A. S. Chalk, the amendment was agreed to, and on being put as the motion, was carried. This matter is to be a recommendation to the Government.

CORRESPONDENCE

Photograph of Baron von Mueller presented to the Club by Mrs. A. O'Bryan. Accepted with thanks.

Mr. Paul Black, with reference to transferring ferns from private gardens to burnt-out areas. Suggested that the matter be kept in mind.

Mr. J. Searle, regarding Biological Survey of Port Phillip Bay. Resolved that members interested discuss the matter at the next meeting.

REPORTS OF EXCURSIONS

Reports of excursions were given as follows: Sydenham, Mr. A. C. Frostick (with slides by Mr. Barkla); Bay Trip, Mr. H. P. Dickins; Maribyrnong River and Footscray Gardens, Mr. L. W. Cooper, for Mr. G. N. Hyam.

ELECTION OF MEMBER

On a show of hands Mr. R. L. Fyfe was duly elected as an ordinary member of the Club.

GENERAL BUSINESS

Mr. T. Dodds showed a selection of photographs, illustrating the work in re-afforestation around Broken Hill, started by the late Mr. Albert Morris.

EXHIBITS

Mrs. J. J. Freame.—Marine Life specimens from Altona.

Mr. C. French.—Original coloured drawings (by P. Tattari) of 21 species of Australian beetles named after the late Mr. C. French, Senior.

Mr. A. A. Baker.—Specimens of Cassiterite and Ironstone Bombs, from Mt. Toora tin deposits.

Mr. T. Dodds.—A series of forms of the mineral Calcite.

Mr. S. R. Mitchell.—A series of Calcite specimens.

Mr. F. S. Colliver.—A series of Calcite specimens.

Mr. T. S. Hart.—*Persoonia*, collected by Mr. W. Hunter at Bendoc, very close to *P. lucida*, var. *latifolia*; and a new record of this variety. *Pomaderris phillyrenoides*, Buchan and Ingeegoohee; a new record for Victoria; previously included in *P. elliptica* and overlooked. *Pomaderris ledifolia*, var. *angustifolia*, from Ingeegoohee River. *P. clachophylla* (Small-leaf *Pomaderris*), Moscow Creek, Ingeegoohee district, below the Cobberas Mountains, at an elevation of 2,500-3,500 ft. (This is a tall shrub well over 6 ft. commonly up to 10 or 12 ft.) All collected by Mr. W. Hunter. Buloke, *Casuarina Luehmannii*, a Slender Mistletoe (*Loranthus linophyllus*), growing on it. This specimen was collected by Miss E. K. Turner at Callawadda, Richardson River, near the east end of the Wimmera Plains, though not actually within the area draining to the Wimmera River.

The Committee of the Field Naturalists' Club of Victoria invites members of kindred societies who may be visiting Melbourne, to attend the Club's meeting.

ORNAMENTATIONS OF A NEW HEBRIDIAN FLUTE

By C. P. MOUNTFORD, Acting Ethnologist, South Australian Museum, and RONALD M. BERNDT

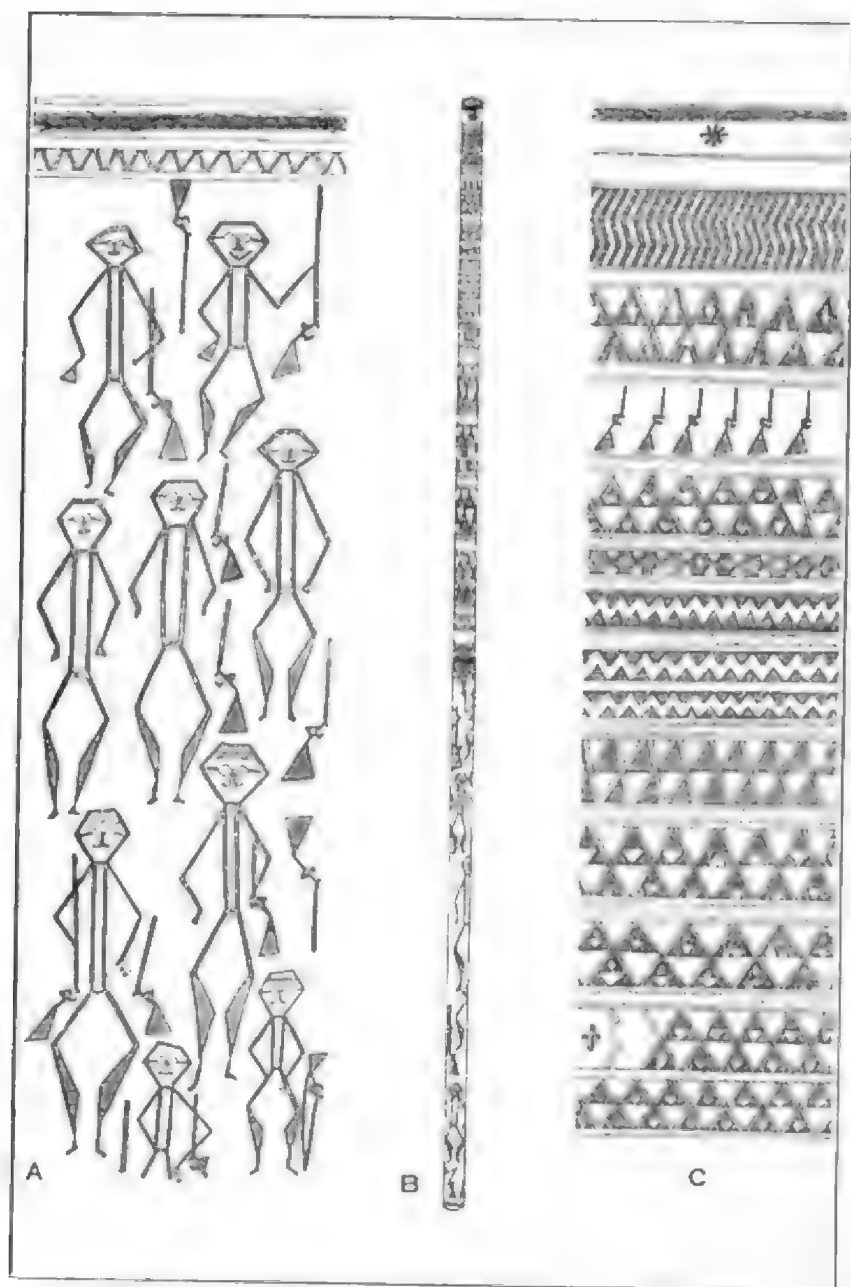
(*Contribution from the South Australian Museum*)

In the ethnological collection of the South Australian Museum is a New Hebridian bamboo flute, purchased some twenty years ago from the Stacey collection. This flute (B), which is 1.12 m., in length, consists of two nodes of a bamboo, the hole being situated slightly to the side of the central node. Both the central and end nodes are intact. Only one half of the bamboo is in reality a flute and the note produced by the player would be the same as that of a stopped pipe 66 cm., in length.

But, to the authors, the point of interest is the decoration of this musical instrument. One end—that by the way which was useless from the point of a flute—has been decorated in fine hair line engravings with a number of bespectacled individuals carrying guns. In the accompanying text figure about two-thirds of the design on either end is shown, A being the section on which is depicted with considerable skill, but in an unusual manner, a definitely European type of individual, with spectacles, an upturned dandy moustache and a suggestion, in several of the figures at least, of a decoration across the forehead (probably gold braid on a cap). Curiously enough, except in two figures out of the twelve (seven in the text figure), only two are shown with a mouth, the one on the upper row with a definitely jocular expression; on the other that feature is indicated with a short but definite mark. The guns are sometimes associated with the soldier, or beside him while the individual, himself, is standing in different poses such that are familiar to any associated with military life, even of the present day. The man on the lower right appears to be standing with his hands in his trousers pockets.

The flute was probably engraved in the days when muzzle-loading guns fitted with percussion caps were used, say about 1870-80. In all cases, the nipple at the base of the barrel, and the large outstanding trigger are depicted so realistically that identification is easy.

To the native, the soldier with his gun was a thing that impressed itself deeply on the mind. The soldier did not coax, haggle or convert, he shot, and swift death followed in its train. No native weapon, carefully prepared magic or death chant had any effect on these new visitors with this death dealing object. The soldier and the rifle were inseparable, and native people from all over the world have depicted this new terror in many ways. Lipps, in *The Savage Hits Back*, deals excellently with this aspect in a well written chapter.



Engraving on New Hebridian Flute.

But, further to increase the interest in this somewhat remarkable flute is the fact that whereas one end (A) is engraved with soldiers and guns, the opposite end (B) is decorated with the geometrical art of the people, except for a single frieze of guns.

The natives of the Congo, Dahomey and German East Africa have produced an almost inexhaustible supply of carving in the round which depict, in ridicule, the whole gamut of soldier peculiarities. The Plains Indians of the United States made records in the shape of winter counts which remain enduring witness to the destruction of a simple people, while the people of the Pacific Islands, neither as skilled as the negroes or as the American Indians, have left on their bamboo pipes a permanent record of the new horror that came from over the water, the soldier and his gun.

Literature

Lipps, Julius E., *The Savage Hits Back*, London, 1937.

ACRIDOPEZA AND RAGWORT

The Mountain Grasshopper (*Acridopesa reticulata*) in all its stages, was extremely numerous at Sorrento from October until the middle of December last. The ensuing drought completely destroyed large areas of Ragwort (*Senecio Jacobaea*) from Rye to Sorrento, with the consequence that the food supply of the Grasshoppers was cut off. No Grasshoppers have since been seen in those parts. In normal seasons they would be numerous until late autumn. Unless seeds of Ragwort from previous seasons are lying dormant in the ground, there should be no Ragwort this year, and consequently no Mountain Grasshoppers. It appears to be an interesting association between plant and animal, resulting in benefit, to the Grasshopper only, in normal seasons.

EDITH COLEMAN.

Note on Exhibit, March, 1939, Meeting.—Calcite, calc or calcareous spar or limestone occurs in a very great diversity of forms, the chief of which are included in this exhibit. It crystallizes according to the rhombohedral class of the hexagonal system. The rhombohedral form is shown in the fragments of Iceland spar shown. The crystals are of very varied habit, there being various forms of rhombohedra, true hexagons and various combinations of these two forms. Calcite in the form of limestone is very widely distributed, but in this form carries many impurities. Generally, in parts of limestone beds pure crystalline calcite is to be found as at Lilydale. Calcite may form the gangue stone of mineral lodes, particularly in association with the sulphides of lead and zinc as in Missouri, U.S.A., and in parts of the Broken Hill lode, specimens from which are in this exhibit.—T.D.

NOTES ON THE WANDERER BUTTERFLY
(*DANAIDA ARCHIPPUS*) IN AUSTRALIA

By EDITH COLEMAN

New eyes are always ready to read new meanings into old stories—which is my excuse for writing on such a familiar subject as the Wanderer (*Danaida archippus*), a butterfly with many aliases.

The name Monarch may be appropriate in its own country (North and Central America), but in Australia, where other beautiful butterflies have an equal claim to the title, Wanderer is surely more suitable—for a butterfly which has so greatly extended its range. (South-west and west over the Pacific to Australia and the Malay Archipelago; east over the Atlantic to the Canary Islands.)

One brood has been recorded in Europe—artificially reared. It visits Britain in the autumn, but does not breed there, owing partly to the climate, but chiefly to the absence of indigenous *Asclepiads*. In Australia it feeds on the introduced Swan-Plant or Cotton-Weed (*Asclepias fruticosa*), and the Broad-leaved Cotton-plant (*A. rotundifolia*), both of which have become acclimatized, the former in the eastern States, the latter in South Australia—a stronghold of the Wanderer.

In the absence of these plants the larvae will complete their development on the introduced Moth-plant (*Arum arifolium*), probably also on other *Asclepiads*. For some years this handsome butterfly has held a special interest for me. Each season I have reared some, in the garden, and in the house.

I have watched the metamorphosis of many beautiful butterflies, but none has given me greater pleasure than that of the Wanderer.

Every stage is fascinating, from the breaking of the tiny acorn-like eggs to emergence of the perfect insect.

The hatching of the eggs is always a surprise. In about four days after their appearance on a leaf, one notes that their yellow colour has changed to white, like waxed paper. One fancies that these white eggs must belong to some other butterfly. I was several times puzzled by this change of colour until I saw the larvae emerging, a few hours later, to make their first meal on part of the egg-shells.

It is not possible to estimate accurately the duration of the egg-stage unless one actually sees the butterfly leave a previously clean leaf. It is almost certainly no longer than four days, probably less. There are at least three broods, probably more, for one finds on the food plant, at the one period, eggs as well as larvae in every stage of development up to pupation point.

Pupation takes place in 14-16 days, the pupal stage lasting 15-20 days, the variation in time being, doubtless, dictated by

weather vagaries. No wonder development is so rapid, the larvae are voracious!

Larvae on Other Garden-plants

It is delightful to see them eating up and down a midrib, never cutting their bridges, but stretching across from stem to leaf with body looped, or bringing the leaf nearer to the eater by pulling it



A.—Fully-fed larvae suspended on food-plant. See Key.

into a half-circle, or an ellipse. I have never seen a larva fall (without interference), although many leaf-sections lie on the ground. Several notes appeared last season on an apparent aberration of *Wanderer* larvae which were seen on garden plants other than those known to provide their food. It was assumed that they were feeding on these "foreign" plants, but this was not the case.

We do not usually find pupae attached to plants upon which, as larvae, they fed, but suspended, as *Rainbow* notes, on a plant not far away. The reason seems clear. Were they to pupate on the food plant, they would run the risk of having their anchorage severed by immature larvae.

Although development would probably continue on the ground, it must be remembered that the chosen position of suspension is one which facilitates emergence of the perfect insect.

Moreover, those that pupate on denuded twigs of the food-plant are fully exposed to various enemies. Normally, they pupate on well-foliaged plants. Rainbow observed, as I have done, that most of those which pupate on the food-plant have been parasitized. It may be assumed that the victim had sufficient strength for pupation, but none for the arduous selection of a suitable site. And it



B. Pupae, in various stages, on twigs of food-plant.

really is an arduous undertaking, for the matter of site is all-important.

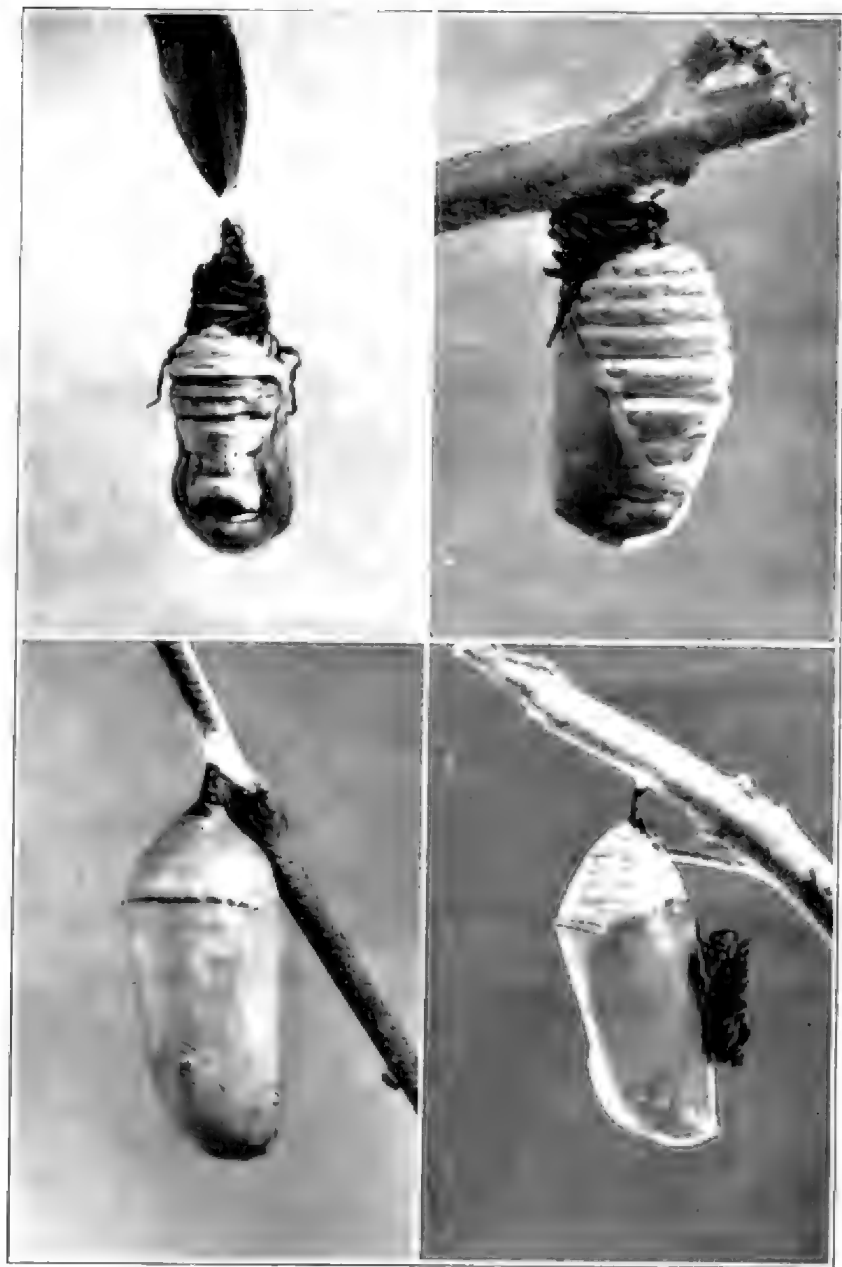
In response to some powerful urge (not to touch on the thorny questions of instinct or tropisms) the fully-fed larva becomes intensely restless, wandering for perhaps two hours in search of a suitable position for pupation.

Replaced on the food-plant, it will leave it again and again, until it apparently decides to accept defeat, rather than use up more energy at such a critical stage.

Plate XVI

I

II



C. Pupation of Wanderer, four stages. See Key.

We are accustomed to think that insects act as they do because they can act in no other manner; yet the larvae, in an emergency, will pupate on the lid of a box, on a wall, or even on a sheet of glass; but always the pupa is securely anchored in a manner to facilitate emergence of the perfect insect. The importance of site is stressed as one sees a larva making tests. Gripping a stem, midrib, or the margin of a leaf, it stretches its body out into space—the very space into which it will swing some 15-30 minutes after attachment, without striking any part of the plant, if tossed by strong winds. It may do this in five or six different places on the chosen plant before the final choice is made.

Matter of Suspension is Vital

There are several other interesting features in this metamorphosis which I have not seen recorded. As regards suspension! Rainbow states that the larva "spins a little tuft of silk in which it entangles its hind legs," and by which it is suspended. But the process, to my mind, is an infinitely more specialized one than his words indicate—one which cannot be dismissed in a few words.

When the little cone-shaped tuft of silk is completed, which takes from 30 to 120 minutes, according to difficulties encountered, the larva may move over it from six to eighteen times, as if testing it. The tuft is pulled and shaped by the bristly hind legs, which are used as hands. I think these feet must be extremely sensitive. If the larva is not satisfied with the shape and position of the tuft of silk, it curves its body, and the head comes round, as if to take stock of the situation.

Eventually the tuft is held between the bristly feet while it is coated with a viscid fluid from the anus. Sometimes the tuft is taken into the anus during this process. This fluid, which hardens on exposure to the air, although derived from the sticky juices of the Milk-weed, appears to have become more viscid in its passage through the body of the larva.

Thus, when the "varnished" tuft is finally gripped by the bristly feet, they are held by a tenacious "cement" which defies wind and rain.

Nor does this cover the whole of the vital matter of suspension. After completing its tuft of silk, the larva places a layer of silk round the base of it, covering leaf or stem, for an area of approximately 6 mm. square, sometimes more, sometimes less. This is seen in the illustration No. III (opposite). The basal silk not only anchors the tuft securely to the leaf, but serves another more important purpose.

During the violent movements of the pupa, in the final stage of pupation, the larval skin is thrown against this silk, in which the bristly feet are caught, thus supporting it during the most critical stage of all, when, for a moment, the pupa actually leaves the

tuft of silk. Two of the fleshy, abdominal segments of the pupa do not leave the larval skin until this most delicate step is taken—a step which almost taxes belief.

The stalked cremaster ("tail" of the pupa) is now withdrawn from the anus. Reaching outward and upward, over the now crumpled larval skin, like a finger, it curves until the hooks that form a burr at its apex catch in the silk of the tuft.

The cremaster, when withdrawn from the larval skin, is soft and flexible, and so readily bends to the "will" of the pupa. It hardens on exposure. With a few writhing, twisting movements the "burr" is actually screwed into the silk tuft.

Then, and not until then, the two fleshy abdominal segments quit their hold of the larval skin!

It is such things as this that make nature-study a warm, living thing, rather than a tedious amassing of facts.

It seems remarkable that the tuft of silk should withstand so much violent movement until one remembers the layer of silk about its base, the coating of "varnish," and the hardening of the burred cremaster, the hooks of which cling to the silk as tenaciously as the fruits of the Forget-me-not, which are so difficult to dislodge from our clothes.

The writhing and squirming are not done to rid the pupa of the larval skin, which I think is accidental, but to screw the cremastral hooks into the silk. It would be immaterial whether the shed skin fell, or remained, as it often does, attached to the basal silk, or to a few stray threads.

The purpose of the fleshy black tentacles has often been questioned. I do not doubt that they embody sense organs of great importance, probably of touch and smell. The pair on the second segment are extremely sensitive until the last stage of pupation, when they become irresponsive to touch. Indeed, one may gauge fairly accurately the time at which this phase will occur by gently touching a tentacle.

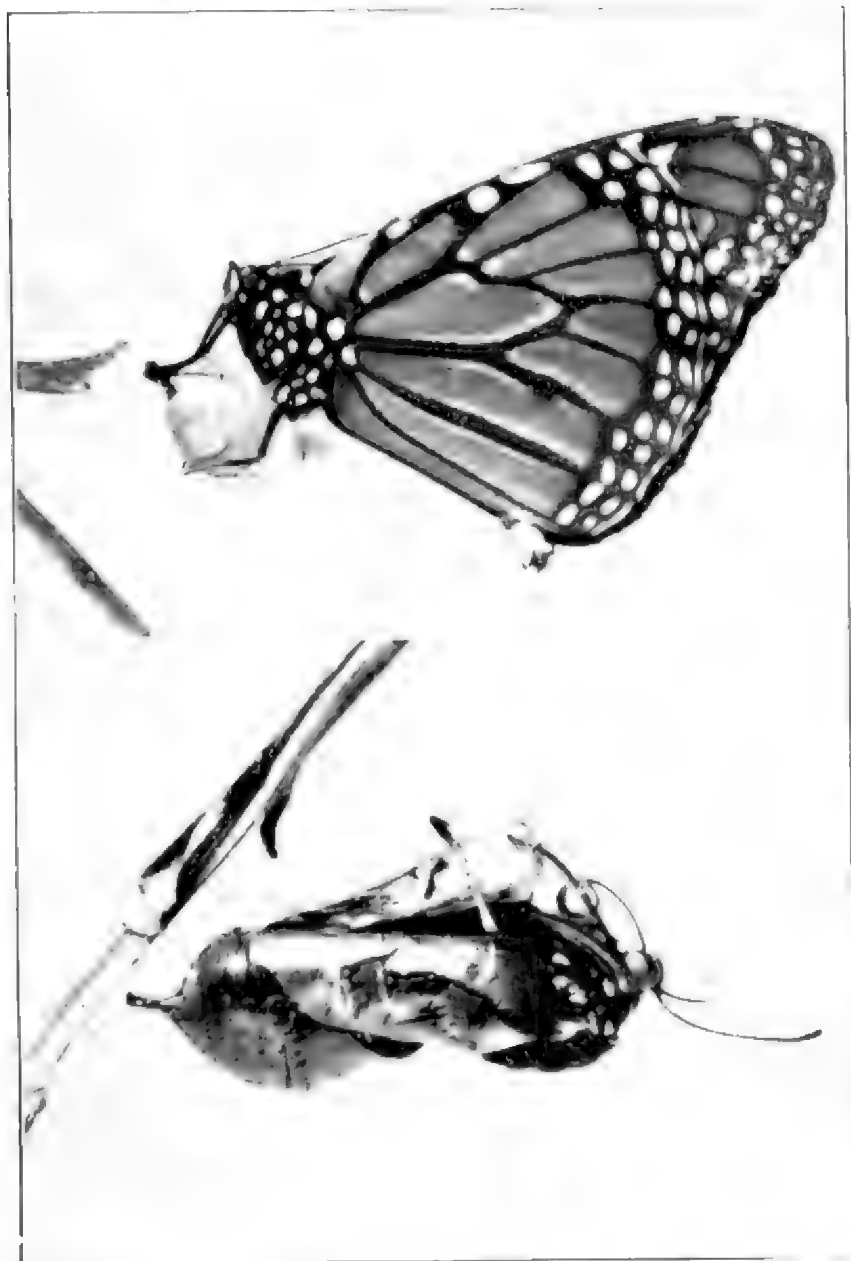
All being well, in a little over two weeks the perfect insect will emerge, taking five minutes to obtain its freedom after the first break in the pupal skin is made (the time taken in shedding the larval skin).

Every step in this beautiful metamorphosis has a high survival value.

The eggs are not deposited en masse, but one or two here and there, a definite safety measure. They are rarely deposited on defoliated plants, or on aphid-infected twigs, thus a danger from insectivorous birds is averted, or lessened. The larvae are protectively coloured in vivid warning signals of yellow and black.

Their odour, too, is probably distasteful to birds. Their immobility, when alarmed, is also a protective measure. A tap on

Plate XVII



F. Third stage in emergence of the insect.

1D. First stage in emergence of the perfect insect.

the twig kept one motionless while a negative was given a four-minute exposure.

The butterfly also exhibits this immobility when at rest, becoming an inanimate object little likely to appeal to a bird which is looking for a living meal.



E.—Second stage in emergence of the perfect insect. The heavy abdomen has fallen out and the crumpled wings are taking shape.

Many other protective features might be cited, all of which suggest that experiences of great survival value acquired by older generations have been transmitted to their descendants—a lazy way of accounting to oneself for an almost mechanical adoption of protective habits.

KEY TO ILLUSTRATIONS

- A. Fully fed larvae suspended from food plant. These were replaced each time they left the twigs in search of other sites. Note that they are attached to stem, petiole, midrib or margin the position giving a clear space in which to swing. Three, which are losing the shrimp-like curve, are near pupation. The one on Fuchsia had wandered from the cut twigs to a vase 15 feet distant, and had made its suspension-tuft before it was discovered.
- B. Pupae, in various stages, on twigs of food-plant.
- C. Pupation of Wanderer—four stages:
- I. Larval skin worked up towards the tail. Note the rippled tentacles. The cremaster is not yet withdrawn from larval skin.
 - II. The flexible cremaster, reaching over the crumpled skin, has caught in the tuft of silk. The two abdominal segments of the pupa have quit their hold on the skin, which is now supported by the layer of silk at the base of the suspension-tuft.
 - III. The layer of silk is seen on the stem and at the base of the tuft. Larval skin fallen.
 - IV. The larval skin has fallen, but is still attached to a few silk threads drawn out from the base of the tuft.
- D. Emergence of the perfect insect, first stage.
- E. The heavy abdomen has fallen from the pupal case. The butterfly clings in this position while the crumpled wings are inflated.
- F. The wings are almost fully expanded. The butterfly clings to the pupal case a little longer, then climbs to the top of the twig, where it rests until the urge comes to use the beautiful wings. Always it rests where there will be an uninterrupted "take-off."

MICROSCOPY AND ENTOMOLOGY

The Microscope and Entomological Monthly (incorporating *The Microscope*) is a monthly British journal that should appeal to many members of the Club. It is of especial interest to the amateur microscopist; while entomologists are catered for liberally, both sections of the magazine being conducted by writers of authority. Specialists discuss their subjects, recent advances, methods and results.

Although entomology has had its place in the pages of *The Microscope*, the publishers have hitherto been unable to give it the prominence it deserves. It was decided to increase the number of pages of *The Microscope* and to issue *The Entomological Monthly* as part of it. In view of the fact that microscopy and entomology are closely allied, it is felt that those who purchase the new journal primarily for either section will also gain information from the other material published. The policy of *The Microscope and Entomological Monthly* is to bridge the gap which exists between the journals of the learned societies on the one hand, and the purely popular press on the other.

The yearly subscription (12 issues) is £1/1/-, postage 1/-; single numbers, 1/9. N. H. Seward Pty. Ltd., 457 Bourke Street, Melbourne, sole Australian agents, are booking subscriptions.

